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EDITED BY

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THE

INDIAN FORESTER.

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A tour in Jaunsar.

Every year, in the months of April and May, the students of the Imperial Forest School, Dehra Dún, are taken on tour through the forests of the Jaunsar Division in the School Circle, which comprises the Reserved Forests in the Government Estate of Jaunsar and the Leased Forests in part of Tehri-Garhwal. There are many matters of great interest to be seen in these forests ; in Forestry there is the natural reproduction of deodar, blue pine, long-leaved pine and oak, as well as the artificial reproduction of all these trees and especially deodar, also the working of the forests under their working plans framed by Mr. N. Hearle, Deputy Conservator of Forests ; in Forest Engineering there are hill roads and the works connected with them, the timber sledge roads of Thadiar, Deota and Bamsu, suspension and girder bridges, river-training works, &c. ; while the Botany of the tour which occurs at the time when most of the chief trees and shrubs are in flower, is most interesting.

For several years, it has been the custom to prepare journals of these tours and in this way the following have been printed and published at various times and some them are still available at the School.

For 1885 prepared by Mr. W. R. Fisher.
" 1886 " " " A. F. Broun.
" 1887 " " " W. R. Fisher.
" 1888 " " " A. Smythies.
" 1891 " " " C. G. Rogers.

while that for 1892 is in manuscript prepared by Baboo Upendranath Kanjilal. It is unfortunate that those for 1889 and 1890 were omitted. In the following notes which Mr. A Smythies has put together, much of the information contained in these various journals has been incorporated with observations made during the tour of 1893 ; and as it is believed that the account of the works visited is likely to be of interest to readers of the Forester we have decided to publish them in our pages.

HONY. EDITOR.

FORESTS NEAR CHAKRATA : April 12 to 18.

Roll call at Morrow's Neck at 8 a. m. In the afternoon we inspected the Fuel and Timber sheds in the Depôt. The old Fuel shed is 146 ft. long and 40 ft. wide. It is entirely built of wood, the original cost being Rs. 5,000, exclusive of the price of the timber. It is divided into 7 compartments, each 20 ft. long. The stack of fuel at the outside near the wall is 8 ft. high The next is 10 ft. the next 11½ft., the next 14 ft., and the next 16 ft. There are 5 stacks in the middle, each 18 ft. high, and a similar descending series on the other side. Each stack is 20 ft. long and 2 ft. wide. Thus the contents of a compartment

$$= 2 \times 20 \left\{ 2\,(8+10+11\tfrac{1}{2}+14+16)+5\times 18 \right\}$$
$$= 8{,}360 \text{ st. cu. ft.}$$

Therefore the contents of the whole shed

$$= 7 \times 8{,}360 = 58{,}520 \text{ st. cu. ft.}$$

Oak and fir are stacked separately, and the fuel is issued to the Commissariat Department by measurement, not by weight. There are many reasons for this. First of all, the weight of fuel is never constant ; it may be green when it comes in from the forest, and it dries slowly in the shed ; but during the rains, it is quite possible that it absorbs moisture to the extent of 15 or 20 per cent of its dry weight and loses it again during the next dry season. Moreover, it would be almost impossible to weigh out such a large quantity of fuel as the Commissariat requires which amounts to 140,000 st. c. ft. every year.

The connection between measurement and weight of Chakrata fuel has been found out by experiments, and stands thus:—

230 st. c. ft. of oak fuel weigh 100 maunds
320 „ „ fir „ „ 100 „

It has been further ascertained that for this kind of fuel, 100 st. cu. ft. are equivalent to 66 solid cubic ft. The present selling price to the Commissariat is Rs. 17 per 100 st. cu. ft. of fir and Rs. 25 per 100 st. cu. ft. of oak.

A small fuel shed has been built to contain fuel sold to the general public, and to keep it dry during winter and the rains. The stacks in this shed contain 50 cu. ft. each and they are sold at Rs. 5/8 each. Besides this there are faggots of Indigofera and other woody shrubs, 2 ft. long and 2 ft. in diameter which are sold at 3 annas a bundle.

The Parade Ground Fuel Shed. This fuel shed is similar in construction to the one at the depôt and the pitch of the roof is 42° 30′. We saw fuel from the Korwa and Kalsi coppices being stacked in this shed. The Kalsi fuel consists chiefly of sal, sain, bakli, dhaura, kusam, haldu, jamun, raini and amaltas. Jhingan, kharpat and other inferior kinds are not brought to Chakrata, but are converted into charcoal on the spot. In connection with the shed is a dry shoot about 50 ft. long with a slope of 34°. Carts

are unloaded at the head of the shoot and the fuel is shot down. The following are the rates for Kalsi fuel:—

Felling, cutting up and stacking ...	Rs.	2	0	per 100 st. c. ft.	
Carriage to roadside	„	0	8	„	„
„ to Chakrata	„	15	12	„	„
Stacking in shed	„	0	3	„	„
Total Expenditure	Rs.	18	7	„	„
Selling rate	„	25	0	„	„
Therefore profit.	„	6	9	„	„

From the Korwa coppice only oak fuel is brought to Chakrata, the rhododendron and ayar being sold to the Brewery. The following are the rates for the Korwa fuel:—

Felling, cutting up and stacking ...	Rs.	2	0	per 100 st. c. ft.	
Carriage by mules	„	10	14	„	„
Stacking in shed	„	0	3	„	„
Total Expenditure	Rs.	12	7	„	„
Selling rate	„	27	0	„	„
Therefore profit	„	14	9		

but Korwa is only 8 miles away, while Kalsi is 26.

The Timber Shed at the Depôt.—This is a wooden building with two storeys, and timber of the same description and scantling is, as far as possible, stacked in one place. In the lower storey there is a frame work supported on posts on which all the timber is placed, nothing being put on the ground. There are scantlings and planks of deodar and fir of nearly 130 different sizes, besides odds-and-ends of miscellaneous species. As an exercise, the students were told off in sections and counted the whole of the stock. First class deodar scantlings are sold to the Executive Engineer, Military Works, at Rs. 1-12 per cubic ft. ; second class pieces are sold at Rs. 1-6 per cubic ft, generally to private persons. First and second class planks sell at Rs. 1-8 and Rs. 1-4 per cubic ft. respectively.

The system of marking scantlings is as follows. A circle with a broad arrow inside called the 'pat mark, is stamped on each piece. Besides this, three figures are stamped on each scantling ; the first indicates the length in feet, the second the breadth in inches, and the third the thickness in inches. Thus the figures 12 12 1 on a plank would mean that it is 12 ft. long, 12 inches broad and 1 inch thick. At present all the deodar timber comes from the Karamba forest near Mundali, about 16 miles from Chakrata. It is carried entirely on men's backs, the weight of a load being about 1½ maunds. The value of timber in the shed is from Rs. 10,000 to Rs. 12,000.

The Cantonment Forest Blocks.

The Cantonment of Chakrata was founded in 1865, when the forests lying on the slopes of the Chakrata ridge came into the hands of the Cantonment authorities and the two Blocks which were handed over for treatment to the Forest Department form one Working Circle under the plan.

In 1880, these two blocks were taken over, *viz.* Lurli with an area of 290 acres, and Suitoli with an area of 188 acres. They are both demarcated with masonry pillars numbered consecutively, and are treated exactly like reserved forests, with this exception, that any surplus revenue, after paying for maintenance and planting operations, is handed over to the Cantonment authorities. Up to date the surplus revenue has been about Rs. 1,305.

They are situated in the zone of the Ban oak (*Quercus incana*), the elevation varies between six and seven thousand feet, and the forest consists principally of ban oak, ayar, and burán (*Rhododendron arboreum*), with the usual shrubs and under shrubs. In the damper ravines of Lurli we find moru oak (*Quercus dilatata*), laurels, the small ringal (*Arundinaria falcata*), maple, holly, and other species.

The Lurli block has a general westerly aspect, while that of Suitoli is easterly, the result being that the latter is much hotter and drier.

In the two blocks, about ninety acres have been, at different times, sown and planted up with deodar, blue pine, chir, moru, and ban.

The Lurli Block. This block has been closed against fire and grazing since 1880, and plantations to fill up blanks were commenced in that year. In the beginning, by way of experiment, sowing in patches, both in horizontal and vertical lines, was resorted to. We inspected the plantation of 1880-81, area about 12 acres. Deodar and blue pine were sown in patches with a little ban oak, and vacancies were filled up from time to time by plants from the nursery below the Hospital and also from patches which had too many plants in them. This continued for 3 to 4 years, and in this way 16,000 deodar plants have been put out since the original sowings. Measurements taken in this plantation at different times give the following results, as recorded in the various journals:—

		Deodar.			Blue pine.		
		ft.	in.		ft.	in.	
1885	Average height	0	9		1	7	
1886	" "	1	0		1	0½	
1887	" "	1	5½		3	1½	
1888	" "	1	10	(720 plants)	4	0	(40 plants)
1891	" "	3	6	(281 ")	6	10	(49 ")
1892	" "	4	1	(589 ")	8	8	(71 ")
1893	" "	4	0	(150 ")	9	0	(38 ")

The deodar plants lower down the slope are taller than those higher up near the path. Very few of the former were measured this year, otherwise the average height would certainly have been more than 4 ft. In the sowings of December 1881, the patches were arranged in vertical lines, 3 ft. one below the other, the lines being 15 ft. apart. This system of sowing renders inspection exceedingly troublesome, and has now been abandoned for the horizontal method. It is difficult to distinguish between the plants resulting from sowing, and those put out.

We then inspected the ban oak and chir pine plantation of 1882. 8,400 patches in horizontal lines 15 ft. apart were sown with chir and ban oak in June 1882. They both germinated well, but the ban oak subsequently died owing to the southerly aspect and to the shallow rocky soil. Of the chir pine about one half have died. The altitude of this plantation is 6,500 ft. which is the upper limit of chir pine, hence it is not expected to do well. Those which have survived are chiefly found on south-westerly aspects. Measurements made in this plantation in past years give the following results:—

				ft.	inches
1885	Average	height		0	5
1886	,,	,,		1	6
1887	,,	,,		1	6
1888	,,	,,	(738 plants)	2	2
1892	,,	,,	(274 ,,)	5	1

in 1893 two of the longest shoots were 18″ each.

These plants have thoroughly established themselves and are doing fairly well.

On the same slope, above the path, 3,500 pits were sown with deodar and blue pine in December, 1884 It was expected that these species might thrive at a higher elevation, but they all died out, and a partial resowing was made with ban oak ; this, however, has not succeeded well, and the probability is that, at this elevation, a southerly slope is too hot for anything but chir.

We then proceeded to the slope below the hospital with a northerly aspect and fairly well covered with a forest of ban oak, and its companions. Here two plantations were made in 1882. In the one to the east of the nursery, about 6 acres in extent, 4,000 pits were planted with deodar taken from the nursery, two plants being put in each pit, and vacancies were filled up in 1885 and 1886. In the other plantation situated to the west of the nursery near the boundary of the block below the Hospital, 8,900 pits were prepared over an area of 12 acres and planted in July 1883, with two plants to each pit, the plants being taken partly from the nursery and partly from surplus stock from the other plantations.

The nursery from which these plants were taken contains a large number of seedlings, which will be put out next July. The nursery

is terraced, and each bed is raised, as deodar must be well drained. We noticed some of the original seedlings which had been left undisturbed in the beds; their height is three times as great as that of the transplants, owing to better soil, better cultivation, and to their roots not being injured. The original plants came from seed of 1881, which was a very good seed year. This plantation is considered a great success, and measurements made shew the following results:--

				ft.	in.
1886	Average	height	(534 plants)	0	10
1887	,,	,,		1	8
1888	,,	,,	(1500 ,,)	1	8½
1891	,,	,,	(160 ,,)	3	11
1893	,,	,,	(553 ,,)	4	0½

This year only plants out in the open were measured; those in sheltered places, *e. g.* just below the Hospital, are 8 to 10 ft. high, and if these had been included, the average would have been much higher. Last year, the average length of the annual shoots was found to be 11 inches.

In the nursery, the deodar seedlings are pricked out into nursery lines in July of the first year, the spacing being 9″ × 3″. During the first year they are shaded by grass tatties, and after about 2 years in the nursery they are from a foot to 18 inches high and are ready to be put out into the forest. They are sometimes transplanted twice in the nursery lines in order to encourage the development of bushy roots and to prevent the formation of the taproot. This year there are about 5,000 deodar plants fit for planting, of which 3,000 will be put out in Korwa, and the balance in Cantonments.

On the boundary line, near pillar No. 4, we noticed the great contrast between the Government forest and village grazing lands, the former having thick grass, and natural seedlings of ban, ayar (*Pieris ovalifolia*), rhododendron and various shrubs, the latter shewing only bare slopes cut up by innumerable small paths with the grass grazed and burnt every year, and a few lopped trees scattered here and there.

A curious fact in connection with Lurli is that we find numerous blue pine saplings self-sown, but no parent trees are known to exist in this forest. It is possible that the seed may have been blown across the valley from the heights of Matkangra—a distance of two to three miles in a straight line,—or they may have been dropped by birds.

It is in this block that the junction of the Chakrata slates and shales with the Deoban limestone takes place, and this accounts for the richness of the soil.

In all these slopes the aid given to deodar seedlings by the natural growth of ban and ayar is considerable, and shews the importance of giving young deodar some sort of lateral shelter during the first few years.

Owing to the abnormally severe winter, the spring of 1893 was very late ; we found rhododendron in full bloom, and willow, birch and ayar only just coming into leaf. One of the pines in the plantation of '80-'81 bore a cone.

The Sutoli Block.

The area of this block is 188 acres. The aspect is principally east, and the soil is much drier than in Lurli, and not so deep.

Two plantations have been made in this block. One in 1882, with an area of 15 acres ; and another one in 1884, with an area of seven acres, lower down below the path.

In the upper portion of the plantation of 1882 no less than 20,000 trees have been put out from time to time, including deodar blue pine, chir, *Quercus serrata* from Assam, twenty or thirty different kinds of eucalyptus, Assam pine, &c., all taken from surplus stock from the forest garden. The result, as far as the exotics go, has been a complete failure, the indigenous trees alone thriving fairly well.

The recorded measurements in this plantation are as follows :—

				ft.	in.
1885,	Average	height	(20 deodar)	0	11
1886,	,,	,,		1	6
1887,	,,	,,		1	10
1888,	,,	,,	(25 deodar)	3	6
1891,	,,	,,	(149 ,,)	3	7
1893,	,,	,,	(109 ,,)	4	6

The lower plantation was sown with chir pine, in July 1884, and partially re-sown in 1887. The measurements taken are as follows :—

				ft.	in.
1885,	Average	height		1	1
1886,	,,	,,		1	6
1887,	,,	,,		2	5
1888,	,,	,,	(18 plants)	4	1
1891,	,,	,,	(140 ,,)	5	8
1892,	,,	,,	(163 ,,)	5	6

The Forest Garden.

The forest garden is situated at an altitude of about 6,000 ft. on a spur running down from the dâk bungalow. Its area is 48 acres, of which 15 acres on a northerly aspect are covered with ban oak forest, the remainder consisting of undulating ground well adapted for the purpose of a nursery. It is irrigated by a canal which comes from the dhobies' ghat about half a mile away.

The object of the forest garden is to make experiments with exotic trees, and to grow fruit trees and distribute them to villagers. Vegetables were formerly cultivated for the troops, but under a recent Government Order this has now been abandoned.

The garden was made over to the Forest Department in 1881, and in 1882, about 500 fruit trees of the best kinds from Ranikhet, such as pear, apricot, apple, plum, peach, and cherry were planted, and in most cases are now bearing most excellent fruit. The

apples especially do very well, and they are readily saleable in Chakrata. The revenue varies every year according to the crop, but there is no doubt that in a very short time it will exceed the expenditure.

Each fruit tree is planted in a deep pit, filled with the very best manure. Pears have not been found to succeed, they are attacked, while unripe, by crowds of wasps and hornets.

About 180 species of exotic trees have been raised from time to time since the formation of the garden in 1881, including Australian acacias and eucalypti and conifers from Europe, China and America. The trees which have succeeded best are : *Pinus sylvestris*, *laricio*, *Pinaster*, and *Khasya*, and *Cryptomeria japonica* ; this latter has been thoroughly established in the Darjeeling district and promises to develop into a valuable timber tree. It grows very rapidly, but it will hardly grow so fast in the colder climate of Jaunsar.

The portion under forest has been divided into 5 compartments ; 3 acres were cut over in January 1885, 15 standards being left. The net profit on the wood cut was made over to the Cantonment authorities ; no wood has been cut since, as there has been no great demand for it.

Several of the pines have been planted out among the coppice shoots of the areas cut over, where they are doing well. The Eucalypti have been severely damaged by the heavy snow last winter, and there is little chance of their recovering. The Maritime pine has begun to bear cones ; and several seedlings have been raised from the cones of *Pinus Khasya*, both in Chakrata and below in Dehra Dún.

The Matkangra Oak Forest.

The Matkangra Block in the Deoban Reserved Forests forms a small special Working Circle for the provision of fuel for Military works lime-burning, and the annual yield is fixed at 4,500 stacked cubic feet yearly. As, however, the lime-burning has been stopped, the yield is now devoted to Chakrata fuel supply.

The crop consists principally of moru oak (*Q. dilatata*). The soil is rocky and reproduction is rather backward except immediately below parent trees, where dense thickets of moru seedlings have come up. To supplement the stock, two plantations were made, one above the Jadi road, the other below it.

The upper one, 25 acres in extent, was made in 1874 and planted out in 1875. In 1892, we found the average height of 154 plants to be 11 ft. 6 ins., and in 1893, the average height of 66 plants was 14 ft. 2 ins.

The lower plantation is 26 acres in extent and was planted in 1874 from seed raised in a nursery in 1872. Measurements made here give the following results :—

		ft.	ins.
1886,	Average height (50 plants)	6	0
1887,	„ „	8	5
1888,	„ „ (17 plants)	8	0
1892,	„ „ (94 „)	14	0
1893,	„ „ (179 „)	15	6

The old nurseries from which these plants were taken, contain trees which have been allowed to grow on undisturbed, only suppressed trees having been removed. Although on a small scale, they form a good example of an artificial pure crop of even age, 20 years old, and now about 20 feet high. The leaf canopy is complete, the lower branches have died off long since, and a thinning could now be made with advantage. The object of such a thinning would be to liberate the crowns of the future trees, *i.e.*, to give lateral space to the crowns of the dominant trees. Being a pure crop of even age the real dominant trees are at first sight hard to distinguish. Still, here and there, one tree has a wider crown than its neighbours, and a thicker stem. More room should be given to such a tree by removing one or more of those which are hemming it in. In other cases, the trees are so exactly equal that the only thing to do is to create a dominant tree artificially, as it were, *i.e.*, to select one and to remove one or more equal trees on either side. In any case the leaf canopy should be kept as close as possible.

The removal of the trees really suppressed in this case does not do much harm. As we are not dealing with a timber tree, the formation of a long clean bole free from branches is not important; moreover, the suppressed trees are saleable to make tool handles. But it should be remembered that in most cases the removal of suppressed trees is indefensible, *e.g.*, in the deodar thicket at Bodyar.

These two old nurseries in the sapling stage, are excellent examples of the necessity of making thinnings and of the great difficulty of doing so in a pure crop of even age raised artificially.

The following measurements have been made in these nurseries from time to time :—

				ft.	ins.
1886,	Average	height		8	3
1887,	,,	,,		13	6
1888,	,,	,,	about	15	0
1891,	,,	,,		17	5
1893,	,,	,,	about	20	0

The boxwood of Matkangra is found in a shady ravine called the 'Bear Garden' among large limestone rocks, in a similar situation to that of Jadi under which a description will be given.

Lower down near the Bear garden we came across a fine specimen of the horsechestnut (*Æsculus indica*), and some of its seeds were germinating on the ground The young leaf buds were just opening. We also saw *Rhus vernicifera* with the flower buds opening, a dense mass of purple anthers. The birch and holly were also shewn to the students.

The leaves of the Moru oak had mostly fallen, and the young foliage was just coming out in beautiful tints of olive green. The tree is never quite leafless, though the leaves remain on the tree for only 12 months. The ban oak, on the other hand, still retained most of the old leaves although the young foliage was appearing.

The Korwa Coppice.

The Korwa forest is what is known in Jaunsar as a "second class forest," *i.e.*, the villagers have certain privileges such as collecting dead leaves for manure, and dead fallen wood. The area is 130 acres, the gradient of the slopes varies from 25° to 40° and the elevation from 5,200 to 6,700 feet. The rock belongs to the Chakrata series and consists of slate and shales with a band of limestone cropping out on the lower boundary of the forest just above the cart road.

When the forest was closed in 1880, an area of 70 acres was left open for the zamíndárs of Korwa for lopping and grazing, on the condition that they should lop very lightly. It was found that they severely lopped and pollarded the trees and hacked them in every possible way. On an adjacent slope is their own zamindari forest, which they strictly protected and it is now as good as any part of the Government forest. This privilege of lopping and grazing in the 70 acres was, in consequence, taken away from them, and the whole area has been put under coppice.

Portions of this area were coppiced in 1888-89, 1889-90 and 1890-91, no standards being left, and the reproduction from coppice shoots is very promising. A blank portion of the area was unsuccessfully sown in 1887 and 1888 ; the aspect was south-east. As will be seen from the table below the yield from the lopped portion was very much less than that from the closed area, being in fact about one-third.

The growing stock consists chiefly of Ban (*Quercus incana*), Burans(*Rhododendron arboreum*), Ayar(*Pieris ovalifolia*), Kaiphal (*Myrica sapida*); and among the undergrowth we found *Berberis Lycium*, *Myrsine africana*, *Rosa moschata* and *Arundinaria falcata*.

The following table shows the outturn of the different coupes :—

Year of felling.	Area in acres.	No. of standards left.	Outturn in cubic feet stacked.		Compartments coppiced.	Remarks
			Total.	Per acre.		
1881-82 ..	7	35	*8,490	1,213	2, 3, 4 (part), 8, 9, 10.	*Some charcoal was made which is not included in this.
1882-83 ...	4	30	9,470	2,367	4(part)5(part)	
1883-84 ...	3	35	7,150	2,383	5 (part), 6.	
1884-85 ...	3	55	*8,900	2,967	12	
1885-86 ..		...	..	..	11	
1886 87 ...	3	60	4,350	1,450	19	
1887-88 ...	5	60	9,940	3,313	20	
1888 89 ...	Closed4	32	6,750	1,687	...	
	Open 2	...	750	375	...	
1889 90 ..	Open 6½	.	5.650	904	...	
1890-91 ...	Open 3	...	2,050	683		
	Closed2⅓	54	3,820	1,530	13	

Year of felling.	Cpts. cut over	Area in acres.	No. of standards left.	Outturn in st. cu. ft.	
				Total	per acre
1891-92	Part of 9 and 10.	1½	50	firewood 4,800 Charcoal 1,074	firewood 3,200 Charcoal 716
1892-93	15	4	148	12,417	3,104

All the oak which can be split up is stacked on the spot and will eventually be taken to Chakrata ; the pieces which cannot be split are sold to the Brewery, or converted into charcoal, and the Brewery also takes all the Rhododendron and inferior fuel, at the following rates, on the spot :—Rs. 7 per 100 st. cu. ft. inferior species, and Rs. 10 for oak.

There are more standards than usual in the coupe of this year as they are of small size. The main objects in reserving standards here are to protect the soil, shed seed, and to yield a larger supply of fuel As many of the stools are too old to produce shoots, the importance of standards as seed bearers must not be over looked. Felling on a hill side always begins at the top, in order to avoid damaging stools already cut, and to prevent the stacks of fuel being knocked down The various coupes are separated from each other by carrying paths, and at each corner is a small stone boundary pillar The coppice is generally cut in February and March, before the growing season begins

The coupe of 1881-82 Aspect N, area 7 acres. The growth of the shoots in this coupe has been very good : ayar, ban and rhododendron being the most numerous, but besides these, cherry, willow, kaiphal and other shrubs have sprung up, forming a dense thicket, and an excellent cover for the soil Measurements taken at various times are as follows :—

1885	height	3	ft. 0·5	inches	(all species)
1886	,,	2	,, 9	,,	(Ban only)
1887	,,	4	,, 5	,,	,,
1888	,,	6	,, 0	,,	,,
1890	,,	6	,, 7	,,	,,
1891	,,	6	,, 11	,,	,,

The oak and the rhododendron grow at about the same rate ; the ayar grows a good deal faster.

The coupe of 1882-83. Here too the growth is good, ban oak forming the greater part of the growing stock. Measurements are as follows :—

1885	height	2	ft.	6	inches	(all species)
1886	,,	3	,,	3½	,,	Ban oak only
1887	,,	4	,,	2	,,	,,
1890	,,	4	,,	1	,,	,,
1891	,,	7	,,	5	,,	,,
1893	,, about	8	,,	0	,,	,,

It can readily be understood that the Forest School Students, who can only devote one morning to the Korwa coppice, have not sufficient time to take measurements in all the different coupes—at the most, they can do some here and some there, as a practical exercise.

Other measurements taken in April 1890, show the following results for ban oak :—

Coupe of	1883—84	Average height	5	ft.	4	inches
,,	1884—85	,,	4	,,	9	,,
,,	1885—86	,,	4	,,	1	,,
,,	1886—87	,,	2	,,	2	,,
,,	1887—88	,,	1	,,	11	,,

In all these observations, it is important to measure a large number of shoots fairly disposed over the whole coupe.

In the higher portion of the forest there are large blanks, in which endeavours have been made from time to time to stock the ground by direct sowing : Australian acacias, eucalypti, blue pine, and ban oak were successively tried, but the three former failed entirely, and the latter succeeded only partially Finally the chir pine was sown in June 1889, and the average height of the plants in 1888 was 5½″. The total number of patches sown was 5,740 ; they were arranged in contour lines of 10′ apart, the patches being 5′ apart in the lines. The patches were 2′ long and 1 broad, and the seed was hand-sown in a line in the middle of the patch. The number of seedlings in six patches were counted in 1888 and 298 were found alive, giving an average of nearly 50 to each patch. The patches were made by contract at a cost of annas 12 per 100; each patch is protected during the hot weather by a grass cowl of a conical shape, with a stick in the middle to support it. For the purposes of our visit, some of the cowls had been recently removed, and we noticed that the seedlings had already begun to suffer from the exposure. These cowls are taken off at the first fall of the monsoon rains in July. Each patch was prepared in such a manner as to allow the water to drain off, a precaution which is also found necessary in the case of deodar.

In spite of these precautions, the sowings, generally speaking, were a failure, and now attention is being given to deodar transplants which are raised in the Lurli nursery in Chakrata. 1,500 deodar transplants were put out in July 1892, and 500 basketted plants in March of the current year, and these all seem to be doing well. The elevation is suitable for deodar and the locality is near the market.

The Korwa forest is one of several pieces of oak forest, which are worked as a special Working Circle chiefly for the supply of fuel to the Chakrata Brewery.

CHAKRATA TO BODYAR, *viâ* JADI: April 19th and 20th.

We inspected the boxwood forest of Jadi, situated some 300 feet below the road, and found the tree in various stages of growth —from a small seedling to a full-grown tree. A good deal of damage had been done to the trees by snow avalanches. Boxwood grows naturally mixed with spruce, holly, maples and moru oak in cool shady ravines, among large rocks and boulders, and is found locally in certain places in the Himalayas, *e.g.*, in the Punjab, at Datmir on the upper Tons, near Chakrata, up the Jumna valley, and in Kumaun and British Garhwal. For the latter see *Indian Forester*, Vol. XI, No. 6, page 283. For the Punjab Boxwood see *Indian Forester*, Vol. XI, page 25. Boxwood is so valuable that it has been exported from here to England ; the first lot sent, which weighed nearly 13 tons, realized £30 per ton. A second lot despatched in 1882, weighing 27 tons, realized £15 per ton. A third lot cut in the Kuphar forest on the Jumna in Tehri-Garhwal weighing 10 tons, was sent to England in 1884, and realized £20 per ton. The cost of cutting and carriage was approximately as follows :—

		Rs. per ton.
Cutting and carriage to Saharanpur and agent's charges	...	54
Rail to Karachi	...	57
Freight to London	...	38
Total	...	149
Receipts per ton	...	Rs. 328

As is well known, boxwood fetches a high price for engraving, the very best quality only being adapted for this purpose. The best boxwood is found in Persia and Turkey in Asia,

An examination of this wood, made by the writer in 1882 in the East India Docks, London, showed that the Persian boxwood is more slowly grown than the Indian variety, and is probably in consequence more close-grained.

Boxwood for the market should be in pieces three feet long, with a diameter varying from 4 to 6 inches: it should be free from knots and cracks, and in case there is liability to split, it is advisable to make a longitudinal cut with a saw from bark to centre. The Indian boxwood has, at present, rather a bad name in the market, and there is not much likelihood of its being exported to England on a large scale. A small number of trees can be sold to merchants from Amritsar, where the wood is worth Rs. 5 a maund, and is used principally in the manufacture of combs.

On this march we noticed the character of the Deoban limestone series—the peculiar weathering, and the manner in which it is dissolved under the soil by action of rain water containing carbonic acid ; it is interspersed with shales of various colours, generally grey, which yield a clayey soil.

Near Jadi village, where we encamped for the night, we observed deodar trees lopped for litter and manure, and moru oak lopped for fodder. Further on, we found spruce fir lopped in the same way.

We also found good specimens of the male and female flowers of the spruce ; the pollen was not quite ripe and the scales of the young cone were, of course, open. We noticed that the cones were upright, generally near the ends of the branches. *Acer pictum* and *Buddleia paniculata* were seen in flower, as well as *Prunus Padus.*

After passing Lokandi lani, we went through a small portion of Missau 2nd class forest, open to grazing, and then went on to Bodyar.

(to be continued.)

The Formation of Dew.

The invitation to discuss the Formation of Dew in the pages of the *Indian Forester* was very acceptable, as I had during the past camping season given the matter some attention and arrived at certain conclusions. An aqueous deposit on foliage may be of two kinds. First, when the moisture from the air is deposited owing to a fall in temperature reducing the power of retention of moisture. This is what is commonly understood by "dew." Second, when moisture is deposited by transpiration of aqueous vapour from the plant itself. In either case the amount of moisture in the air is responsible for the *visible* results. In the first instance this is self evident; in the secon although the transpiration of aqueous vapour from the foliage may be actively proceeding, no deposit of moisture would take place if the air were dry. Given an atmosphere saturated with moisture, suppose a fall in temperature, then a "dew" deposit must take place on surrounding objects; but the air at the lower temperature being still saturated with moisture, evaporation cannot proceed and the aqueous vapour given off from the foliage is deposited as dew on the leaves. In such instances we notice dew on *both* sides of the leaf. Again given a moist but not saturated atmosphere in which little evaporation can take place, suppose a fairly equal temperature; in this case there may be no true dew deposit from the air and yet the aqueous vapour given off by the leaves may still be deposited in the foliage as dew ; we should then remark, perhaps, that the under surfaces of the leaves were studded with dew drops whilst the upper were quite dry. It is evident therefore that there may be a dew deposit on forest trees whilst there is none on the ground or elsewhere where foliage is wanting. The conditions inducing the above phenomenon are most favorable in early spring when the atmosphere is not excessively moist and the temperature is equable. The want of evaporative power in the air alone affects the *visible* deposit on

the leaves of aqueous vapour given off by the foliage; the transpiration of aqueous vapour from the foliage may even be greater when their is no *visible* evidence of it. It is entirely immaterial whether the moisture in the air is in "the winds that blow above" or is due to "the vapour given off by the earth below." *A true dew* deposit is only possible when at a given temperature there is an excess of moisture in the air and when this temperature is attained. *A foliage dew* deposit is only possible when the evaporative power of the atmosphere is too feeble to permit of the absorption of the aqueous vapours given off by the plant. An abnormally small dew deposit in forests is traceable therefore in reference to true dew, to an abnormal deficiency of moisture in the air, irrespective of whether such moisture is acquired at a distance or locally. A small deposit of foliage dew may be due to local drought diminishing the output of aqueous vapour from the plant, but this *must* be accompanied by a dryness in the air which, by evaporation, prevents the deposit on the leaves of such aqueous vapour as is given off. It was most interesting to note that in large areas of forest in these provinces, the Sal tree did not flower this spring. The result of this soon became apparent in a most abnormal and beautiful flush of foliage; and, with the appearance of the young leaves over hundreds of square miles of forest, the atmospheric moisture increased and the temperature fell in a very marked degree.

O. C.

Land reafforested through the intervention of Prickly Pear.

The land near the sea coast in the Bandar, Répalli and Bapatla taluks of the Kistna District is intersected by a net work of tidal salt creeks. For the most part it is very low-lying and is submerged by water from the creeks either at each high tide, or at intervals —for instance, during the rains; and consequently it is impregnated with salt. Such land is called a "parra."

For mile after mile sometimes these 'parras' present a barren waste: in Bandar taluk, for instance, there is a stretch of 'parra' exceeding 20 miles in length, and 1½ miles in breadth. At first sight they seem hopeless for afforestation; but, as is explained herein, this is not the case.

The first vegetation that grows on these 'parras,'—which only exists when the submersion is not daily,—consists of small trailing patches of a herbaceous-looking plant, called locally "Yilakurru." * It possesses fleshy, succulent leaves, somewhat resembling stonecrop (*Sedum*) which are salt to the taste, are used by natives for making curries, and are eaten with relish by cattle when they get used to it.

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* I have not yet been able to identify the botanical name of this plant, as I have been unable to find, so far, flowers or fruit. A. W. L.

After a time, a few patches of prickly pear are found, and once started this plant seems to spread rapidly. In the prickly pear the "Yilakurru" flourishes exceedingly; for, from a trailing herbaceous plant, it becomes a ligneous bush rising in places to 6 to 8 feet in height with a stem of 2 to 3 inches in diameter.

Then we find a grass * growing among these bushes of prickly pear and "Yilakurru", then spring up patches of two other different kinds † between the bushes; and then among the bushes of prickly pear and "Yilakurru" appear seedlings of different kinds of forest shrubs and trees, notably the following:—

Nim or vépa (*Melia indica*), Pála (*Mimusops indica*), Wulinda (*Diospyros Chloroxylon*), Uti (*Maba buxifolia*), Tella tumma (*Acacia leucophlœa*), Nalla tumma (*Acacia arabica*, where black soil is prevalent), Soapnut (*Sapindus emarginatus*), Date (*Phœnix sylvestris*) and Palmyra (*Borassus flabelliformis*),—the last three especially where the soil is sandy.

Finally, a regular scrub jungle is formed of the above-named species interspersed with prickly pear.

The prickly pear seems to form a soil of its own, possibly from its decayed leaves; for whenever the clumps of prickly pear and "Yilakurru" become at all large, it appears as if they rose from small mounds. These mounds become more and more pronounced, the larger the clumps become; and the scrub jungle is always situated on a higher level than any adjoining "parra." It may be suggested that the action is the reverse, and that the scrub jungle and higher ground is washed away by the water from the creeks; but, having considered carefully this side of the question, I examined the ground and the forest, and came to the conclusion that the scrub jungle was not eroded, but formed after the "parra."

In Repalli taluk, the gradual transition from the "parra" to the scrub jungle is completely shown.

In Bapatla taluk, one forest reserve consists of over 9,500 acres of this kind of scrub jungle, with Nim, Soapnut, Pala and other trees of about 15 feet high, with a few Palmyras scattered about. In another reserve in the same taluk, 600 acres, Palmyra and Date are more abundant than scrub. Prickly pear is still abundant in all these reserves, but it is evidently becoming subordinate to the scrub, which should be carefully kept uncut for some time longer to oust the former altogether.

The Prickly Pear has almost invariably been considered hateful to both Forester and Agriculturist, although advocates have been found for "the prickly pear as a protector to saplings" but in this case it appears to be a real benefactor.

The action of the prickly pear and "Yilakurru" between them seems to be (1) to extract the salt from the soil, (2) to render stable the mobile sandy covering of the soil, (3) to catch and protect seeds of jungle trees, (4) to form a more or less fertile soil.

A. W. LUSHINGTON. 26-5-93.

Note by Hon. Editor. 'The 'Yilakurru' is clearly a species of *Suæda* probably *S. nudiflora*. The grasses are probably (a) *Chloris barbata*, (b) *Æluropus purbescens*, and (c) *Sporobolus diander*.

* Kind (a) forwarded herewith. † Kinds (b) and (c) forwarded herewith.

Obituary—G. H. Foster.

We regret to have to announce the death, at the Station Hospital, Cannanore, on the 29th April, of Mr. G. H. Foster, Deputy Conservator of Forests, Coorg. Mr. Foster, who was the son of Major-General Foster, now living at Southsea, was born in October 1849 and was appointed to the Forest Department in 1868; he served chiefly in the Central Provinces and successive Annual Reports bear witness to the excellence of the services he rendered there. In 1892, Mr. Foster was transferred to the charge of the Coorg Forests in which charge he remained until his death, doing excellent work in the reorganization of the department. more especially in the new settlement, and fire-protection. Socially, as well as officially, Mr. Foster's death will be deeply regretted, as he had a large circle of friends with whom he was most deservedly popular and much sympathy will be felt for his widow in her bereavement, which must be all the more severe in that she was absent in England, with their family of five children, at the time of her husband's illness and death.

II.—CORRESPONDENCE.

Destruction of Porcupines.

DEAR MR. EDITOR,

Could you or any of the numerous readers of your Periodical, instruct me as to the most expeditious manner of getting rid of Porcupines ?

I have tried several methods, *viz.*—Digging them out of their burrows—Suffocating them with smoke. etc ! but have signally failed to exterminate these pests.

I have offered as much as Rs. 3. per head for them but without success. Any hints that I may receive through the medium of of *The Forester* will be most welcome.

R. J. P. P.

The Departmental Blazer.

SIR,

I see in a recent number of the *Pioneer* that we are at last within a measurable distance of a Departmental Blazer, and that it will probably consist of alternating stripes of green. I do not know who is responsible for this selection, but, as far as I have heard, no attempt has been made to get at the opinions of the majority of officers. Personally, I should much prefer a blazer on the lines of those used at Cooper's Hill or Nancy; that is a coat of uniform colour, say rifle-green, with a monogram or device on the pocket. The enclosed design for a badge is only a suggestion and is, of course, open to improvement. The crossed rifle and gun represent the Departmental bent for *shikar*, whilst the elephant, besides being the king of all big game, is symbolic both of the Forest Officer and the forests under his charge.

He resembles the Forest Officer in that he is a jungle walla, that he is popularly supposed to be able to do any amount of work, in any weather, and on any food, and that his pay is more kicks than rupees.

He is typical of the Forests in that overworking is generally fatal to him and that he is much easier to destroy than replace.

I have left the motto blank as, during this hot weather, my dog-latin would cause a certain outbreak of hydrophobia. If any one else can supply a milder and less dangerous description, the chance is now before him.

A friend suggests to me that "Tectona Grandis" would look well, sound well, and be, to a certain extent, appropriate; opinions, of course, differ; personally, I think that, although the latin is pure and perhaps harmless, the phrase itself is vague and might be thought technical.

G. R L

The design, which we regret we cannot reproduce, consists of an Elephant's head surmounted by crossed guns and with a label for motto beneath.

Hon. Ed.

III.—OFFICIAL PAPERS & INTELLIGENCE.

Chief Forest Trees used to make Charcoal.

The Inspector General has recently sent round the following Circular. It ought to result in the collection of some valuable information on that branch of Forest Utilization.

"I have the honour to ask that you will be good enough 'to oblige me with a list of the forest trees occurring in your 'Circle, which are most highly appreciated for charcoal-burning; 'together with such information as may be available respecting 'the percentage of weight lost in conversion in the case of each 'kind of wood, whether burned in the customary local fashion or 'according to European methods. Only species which grow 'gregariously, or in quantity sufficient to render them of economic 'importance for charcoal-burning, need be mentioned; and, 'where possible, an estimate of the quantity available should be 'added."

Resolutions of the Forest School Board of Control.

Resolutions passed by the Board of Control for the Imperial Forest School, Dehra Dun, at sittings held on the 26th and 28th March 1893 in connection with the Final Examinations.

MEMBERS PRESENT.

Mr. B. RIBBENTROP, C.I.E., *Inspector General of Forests, President.*
„ J. S. GAMBLE, M.A., *Director of the Forest School.*
Colonel J. C. DOVETON, *Conservator of Forests, Southern Circle, Central Provinces.*
Mr. H. C. HILL, *Conservator of Forests, Central Circle, North-Western Provinces.*
Mr. A. W. PEET, *Conservator of Forests, Northern Circle, Madras.*
„ E. P. DANSEY, „ „ „ *Bengal Circle.*
Mr. J. L. PIGOT, *Secretary.*

RESOLVED—

Final examinations, 1893.

1. That, on the result of the final examinations of 1893, conducted under the superintendence of the Board, certificates be awarded to the undermentioned students. In respect of the six students whose claim to certificates appeared doubtful, but to whom the Board, in the exercise of their discretion, gave certificates, the Director should report to the Conservators concerned the circumstances under which certificates were granted.

I. Higher Standard.

(1) C. S. Rogers.
(2) Gajaraju Mudaliar.
(3) Dhanjishah Avasia.
(4) Hari Keshav Washikar.
(5) T. Arumugam Mudaliar.
(6) W. B. Jackson.
(7) A. B. Myers.
(8) S. Ramasawmiah.
(9) S. Kuppusawmy Chetty.
(10) P. Venkatakrishnama Naidu.
(11) Krishnaji Ganesh Javadekar.
(12) P. S. Govinda Rao.
(13) A. M. Sawyer.
(14) Ramnath Mukerji.
(15) C. E. Allen.
(16) H. E. Kelly.
(17) R. F. Colaço.
(18) W. J. Lane-Ryan.
(19) D. H. Allan.
(20) Kali Charan Varma.
(21) Gopal Krishna Dandawati.
(22) T. S. Brito.
(23) Rajagopal Naidu.
(24) V. Ethirajulu Naidu.
(25) W. G. J. Peake.
(26) R. H. Cole.
(27) Bhawani Das.
(28) A. P. Ramachendra Mudaliar.
(29) Gurditta Mal.
(30) E. J. D. Pierce.
(31) L. Venkanna Naidu.
(32) Abdul Haq.
(33) N. S. Anantacharlu.
(34) Kanhya Lal.

II. Lower Standard.

(1) Shyam Sundar.
(2) Akbar Khan.
(3) Harji Ram.
(4) Sundar Lal.

No certificates with honours were granted by the Board in either standard.

2. That bronze medals be awarded, for the subjects noted, to the undermentioned passed students:—

1. Hari Keshav Washikar : } Sylviculture.
2. C. S. Rogers : }
3. A. B. Myers : Surveying.
4. C. S. Rogers : Forest Engineering.
5. K. Gajaraju Mudaliar : Botany.
6. Krishnaji Ganesh Javadeker : Herbarium.
7. Hari Keshav Washikar : Forest Law.
8. Hari Keshav Washikar : Physical Science.
9. S. Ramasawmiah : Mathematics.
10. Shyam Sundra, Lower Standard : general proficiency.

Upper Class failed students.

3. That it is undesirable to grant Lower Standard certificates to the seven students of the senior Upper Class who failed to obtain Higher Standard certificates.

Backward students: how to be dealt with.

4. That, with reference to a proposition submitted to the Board under which students who fail in the monthly examinations or in the annual examinations at the end of the first year should be required to leave the School, the Director, in the exercise of the discretionary powers vested in him under rule 8 of the existing School Rules ("General)," is competent to deal with students who, at any time during

the School course, show that they are unable to follow the lectures with any prospect of obtaining a certificate at the final examinations. The Director should make use of this power, and either remand unpromising students or arrange for their transfer to the Lower Class.

Examination of junior students.

5. That, with reference to a proposal placed before the Board, to the effect that greater importance should in future be given to the annual examination of the junior students, and that the marks allotted at that examination should count more towards the final results than the marks allotted at the monthly examinations, no change in the existing practice, which was discussed at previous meetings, is desirable; and that the proportion of marks now allotted to the monthly examinations is sufficient.

Comparative importance of written and verbal examinations.

6. That, with reference to the proposal, submitted by the Instructor in Forest Engineering, to set two papers instead of one at the final examinations in that subject and in Surveying, the number of examination papers should be rather reduced than augmented. In the opinion of the Board, a single paper in each subject is sufficient; but the question should be brought forward at the next meeting for further discussion and consideration as to whether greater importance should not be given to the oral tests at the final examinations. The Board desire that, in the meantime, the opinions of the School teaching staff on this subject should be obtained.

Study of Sylviculture by the Professors.

7. That it is, from every point of view, desirable for the Professors of sylviculture to become acquainted with sylvicultural conditions other than those which they study within the School Circle and during their short tours with the students. Facilities should accordingly be given to them, either during the vacation or at other times when they can be spared or replaced, for the purpose of visiting localities of special interest in the various provinces, such as teak forests in southern India or Burma, or sal forests in Oudh and Bengal.

Instruction in Forest Engineering: manual required.

8. That a Manual of Forest Engineering should be prepared. The present course of engineering as taught at the School meets all requirements; and the Board are therefore of opinion that the syllabus of that course should form the basis of the proposed manual. The Board recognise the value of the notes of lectures, delivered by Lieutenant-Colonel Bailey and Mr. Hobart-Hampden and edited by the latter officer, and consider that those notes should be fully utilised in the preparation of the work. The notes, however, will require considerable addition and rearrangement in order to render them complete and in conformity with the School syllabus. The manual should be elaborated beyond the requirements of the School curriculum, so as to be

useful for reference to officers of the department and to the public generally. To carry this proposal into practical effect, the Board consider that, in order to utilize local experience and collect examples and illustrations of local works or practice, the preparation of the manual should be entrusted to an editor with authority to correspond with Conservators throughout India. The present Instructor in Forest Engineering at the School, Mr. C. G. Rogers, is qualified for this duty, and the Board propose that he should for the purpose be forthwith relieved, until the 1st July next, of all other duties in connection with the School. The Board expect that during this period Mr. Rogers will prepare a proof of the manual, which should then be circulated to all Conservators for such suggestions as they may have to offer.

School Volunteering.

9. That the Inspector General of Forests be requested, with reference to the Board's Resolution No. 11 of 1892 and the subsequent correspondence on the subject of volunteering at the School, to consider whether steps could not be taken to arrange for a course of riding lessons for *all* students at the School; and at the same time to make some provision, by money-grant or otherwise, for the requirements in horses of such of the students as belong to the Dehra Dun Mounted Rifles.

Utilisation of the services of the Assistant Agricultural Chemist.

10. That, with reference to the intimation conveyed to the Inspector General of Forests by the Government of India, in endorsement No. 203-4, dated 26th January 1893, to the effect that the utilisation of the services at Dehra and Poona of the Assistant Agricultural Chemist should be arranged for by the Board, the Board are apparently not in a position to act as desired, since necessary information, respecting the period in each year during which the Chemist must be at Poona, as well as other essential particulars, have not been placed at their disposal. At the same time, the Board desire to record that it had been understood that the services of the Chemist would be available at Dehra for the whole period from 1st July to 31st October, and that they consider he can be fully employed during that period.

Forest School Rules.

11. That—with reference to Resolution No. 15 passed at the meeting of 1892, and after consideration of the Circular of the Government of India on the subject (No. 22-F., dated 25th July 1892), and of replies of Local Governments and of the Director of the Forest School thereto, as well as of draft proposed rules submitted by the Director—the Forest School Rules detailed below be adopted. Sections I and III of these Rules relate to the constitution of, and the studies and discipline at, the School, and conform in all material particulars to the existing orders or practice. The Rules of Admission contained in Section II, have been framed after a careful examination of those suggested by the Government of India in the Circular above-quoted. The

Board are unanimously of opinion that, while the existing rules for admission to the School require modification and amplification in important respects, it would be inexpedient to adopt the rules suggested by the Government of India, which do not meet the requirements of the Forest Service. The Board, acting on the suggestion of the Supreme Government that recommendations for a revision of the regulations under which students are now admitted should take the form of draft rules, have accordingly prepared a complete set of Rules of Admission. The Board desire that the Inspector General of Forests should move the Government of India to accord their sanction to the issue of these rules, which should be published in conjunction with the rules contained in Sections I and III. The Board are of opinion that the simplification of the existing rules—the meaning of which is often misunderstood—and the extended publication of new regulations, are matters of pressing necessity, and desire also to record their belief that the rules in their entirety as now submitted, while meeting the requirements of the School, will suitably provide for the recruitment of the provincial forest services on the lines prescribed by Government in the Forest Department Code.

Forest Conservancy in India.

Forestry in India is a comparatively modern institution. In former times, no doubt, considerable areas were scrupulously protected in many parts of the country; but, wherever this was the case, the forests were kept as game-preserves for the pleasure of princes and great nobles. The idea of conserving forests in order to maintain an uninterrupted supply of forest-produce useful and even necessary for the people,—the idea of maintaining a proportion of the country under forests on account of the indirect benefits conferred on the Empire at large by the very existence of forests, —was never thought of by former governments. Even during the earlier times of British sway, the economic value of forests was not recognised, and they were considered more in the light of impediments than otherwise to the increase of cultivation, and consequently to the general prosperity of the empire. This period, however, has passed away; and the necessity for the maintenance and conservative treatment of forests, as a mainstay of agriculture, is now almost universally recognised, while Forest Conservancy is regarded as a duty of the State.

India is not, like Europe, a forest-growing country throughout; its position in a tropical and subtropical climate prevents this, and areas which, with a lesser evaporation, such as takes place in temperate and cold zones, would be clad with dense forest growth, are here arid and may even be desert. Thanks, however, to the barrier which, in the form of the Himalaya, separates the north of India from the rest of the Asian continent, and in consequence of the

pronounced peninsular formation of the Empire, the greater part of the country is suitable for the growth of natural forests. India is a country of extremes, and contains, on the one hand, ever-green forests of a luxuriance and density such as the imagination can hardly picture, and, on the other hand, deserts. The distribution and character of the Indian forests is due, in the first instance, to the more or less plentiful supply of rain, and next to elevation and the influence of the tides. The distribution of the rains in India within distinct periods of time is as marked and accentuated as anywhere in the tropics, and, thanks again to the formation of the country, the monsoons extend far north of the Tropic of Cancer. There are two monsoons, the more important being the summer or south-west. Within the direct influence of the full force of the monsoon rains, the country is covered with evergreen forests. Where the rainfall gets less copious, these change into deciduous forests, gradually blending, with still decreasing rainfall, into dry forests, and ending in unreproductive deserts.

The evergreen forests created by the influence of the south-west monsoon occupy the west coast of the peninsula, up to the ridge of the mountain chain separating the moisture-yielding sea from the rest of the continent. In the same way they are spread over the coast districts of Burma and Chittagong and along the foot and on the lower slopes of the eastern Himalayas. The evergreen forests, due to the winter or north-east monsoon, occupy the Carnatic.

The deciduous forests, which occupy the larger part of the peninsula and Burma and a considerable proportion of the Andamans, are of the greatest importance for the forester, the consumer, and the State. They contain the well known and most valuable species of timber, such as teak, sâl, ironwood, sandalwood, red sanders, and many others: also the padouk *(Pterocarpus indicus)*, which is found in considerable quantities and of large dimensions in the Andaman Islands. This tree has, of all Indian timbers except teak, probably the most promising immediate future. It yields the best wood for ordnance purposes and carriage-building, and is sure to rival mahogany for cabinet-work. The timber is stronger than teak in every direction, lasts longer, is much handsomer, does not warp in seasoning, and only weighs 15 to 20 lb more per cubic foot.

The dry forests are situated in Rajputana and the Punjab, and spread over a large extent of Native States. Towards the north and north-west they become richer and gradually blend into deciduous or alpine forests, whereas they get drier and drier towards the west and southwest and disappear into the deserts on both sides of the lower Indus, where the courses of perennial rivers alone are fringed by a belt of arbori-vegetation.

Alpine forests are found within the Indian Empire along the whole of the Himalaya mountain chain from Assam to Hazara, in the mountains of south Afghanistan and Baluchistan, and on the higher mountain ranges in Burma.

The tidal forests are situated along the greater part of the coast of India and in the deltas of its rivers.

The foregoing are, shortly summarised, the physical capabilities of India as a forest-growing country. There can be little doubt that in pre-Vedic times the greater part of the Empire was covered with dense forests, which were gradually opened out by Kshatriya settlers along fertile valleys and main streams. At that time, and long after, the country was probably more fruitful and the climate less fierce than now, at least if any trust can be placed in the descriptions of Fa-Hian, the great Chinese traveller who visited India in the fourth century, and who described the climate as neither hot nor cold. The destruction of the forests on a larger scale was left to the invaders from the north—nomadic tribes who had been accustomed to roam from pasture to pasture, and who fired alike hills and plains, and destroyed the forests wherever they went. The sway of these invaders extended over upwards of 750 years ; and when, after the battle of Plassey, the foundation of the present Indian Empire was laid, and province after province was conquered, the forest areas had already, over considerable portions of the country, been reduced below the minimum necessary for its well-being, though other portions of the vast Empire were still covered with almost virgin forest.

British rule, instead of putting an immediate stop to further devastation, gave in the beginning a new impetus to destruction. As already stated, the watchword of the day was to increase the area of cultivation at the cost of the still existing forests, and this policy was carried on for years without any enquiry into the merits of each case. Naturally, incalculable harm was done by such inconsiderate destruction of forests, especially in the more populated districts where the demand for new land was greatest, and where the forests were often already of less extent than the state of the country demanded. Large areas, through not immediately destroyed, were alienated by settlements and grants, and were thereby withdrawn from further active interference on the part of Government. Security to life and property enabled the peasants and herdsmen to graze their cattle far from their homes and unprotected, and at the same time cattle increased in value. Herds naturally multiplied, and additional grazing areas being required were cleared by fire, thereby opening the way to future famines and distress. Railways soon spread over the country, and forest growth disappeared with an incredible rapidity within the reach of their influence, partly on account of the direct demands made on them for construction works—demands which were frequently supplied in a wasteful and reckless manner—partly on account of the increased impetus given to cultivation.

It was only when failures to meet local demands for public works were brought to notice, that the value of the forests was gradually recognised. At first, attempts were made to meet such

local failures by local measures, but the insufficiency of this proceeding was rapidly brought to light, and it came to be understood that a question of such general magnitude and importance could only be efficiently grappled with by a special organisation. It was thus that the Forest Department came into existence.

As a matter of course, it rested with the Government to show the lead, and the first step in the new direction was naturally to ascertain the extent of the forest property still remaining in the possession of the State, and in what measure such property was burdened by rights in favour of the peasantry. The Oriental Governments, from which the British Government inherited its forest property, never recognised the accrual of any prescriptive right; but, on the other hand, anybody was accustomed, without let or hindrance, to get what he wanted from the forest, to graze his cattle where he liked, and to clear jungle-growth for cultivation wherever he listed. This state of things, it is self-evident, did not permit of systematic forest management, and it became clear that a Forest Law and a Forest Settlement were urgently required. It was necessary that the Forest Settlement should define (*a*) the forests in which the ownership of the State was still absolute; (*b*) forests which were the property of the State, but which were burdened with legal rights, prescriptive or granted; and (*c*) forests, the property of individuals or communities, in which the State had rights over all or certain kinds of growing trees. After several local Rules and Acts had been introduced and had been in force for a longer or shorter time, the first Indian Forest Act was passed in 1865. This was, however, found wanting in many important respects, and was replaced by the Act of 1878. Even in this new Act, however, faults were at once recognised, and separate Acts were passed for Burma and Madras in 1881 and 1882 repectively. All three Acts provide for the formation of Government reserves and the settlement of rights within them; also for the constitution of village forests; and they contain forest police rules necessary for the protection of Government forests and forest-produce. The Indian Forest Act contains in addition provisions for the creation of protected forests. All three Acts provide for the control of Government over forests not belonging to the State, if such control appears necessary for the public weal, or if the treatment which such forests have received from their owners injuriously affects the public welfare or safety. More recently, special Forest Laws for the newly-annexed province of Upper Burma and for Assam and Baluchistan have been passed by the Indian Legislature, and these contain several distinct improvements on the older Acts.

In the Central Provinces and Bengal, forest reservation had made rapid progress under the wise guidance of Sir Richard Temple, and large areas could at once be declared State Forests under the Act of 1878. The rapid strides which forest reservation has made in Bombay are due to the wisdom and foresight of the same eminent statesman, other provinces are following the same line

with more less vigour, as may be gathered from the following table for 1891-92 :—

Provinces.	Forest area, in square miles.				Proportion of Forests to whole area of Province	Remarks.
	Reserved.	Protected	Unclassed.	Total		
					Per cent	
Bengal ..	5,211	2,181	4,534	11,926	8	
N.-W. P. and Oudh ..	(a) 3.769	93	54	3,916	4	(a) Includes 78 square miles of *leased* forests.
Punjab	(b) 1,715	481	3,874	6,070	6	(b) Iucludes 343 square miles of *leased* forests.
Central Provinces ..	19,680	..	393	20,073	23	
Burma (Lower) ..	(c) 5,615	.	..	5,615	7	(c) Includes 461 squares miles of *taungya* areas.
Burma (Upper) ..	(d) 1,059	(e)16,461	..	17,520	22	(d) Includes 113 squares miles of *taungya* areas.
Assam .. .	3,612	912	5,435	9,959	22	(e) Exclusive of the area of India-rubber forests of which it is not possible at present to from an estimate even.
Coorg . ..	113	743	..	856	54	
Ajmere .. .	139	..	..	139	5	
Baluchistan ..	82	..	..	82	..	
Andamans	..	..	1,957	1,957	98	
Berar ..	2,231	..	2,175	4,436	25	
Total Bengal Presidency	43,256	20,871	18,422	82,549	12	
Madras ,,	(f) 7,175	(g) 9,404	1,304	71,883	21	(f) Includes 37 squares miles of *leased* forests.
Bombay * ,,	10,170	4,319		14,489	11	(g) Includes 154 squares miles of *leased* forests.
Grand Total ..	60,601	34,594	19,723	114,921	13	

* These figures are for 1890-91.

The organisation of the Forest Department was gradually developed at the same time under the energetic management of Sir Dietrich Brandis. The Department, of which the superior staff was re-organised in 1891, is divided into an Upper Controlling Staff (including Conservators, Deputy and Assistant Conservators), a Lower Controlling Staff (providing for Extra-Assistant and Extra-Deputy Conservators), a Protective Staff (composed of Rangers, Foresters, and Guards), and an Office Staff. The Upper Controlling Staff numbers at present 183 officers, of whom 63 per cent. have received a scientific training in forestry and were appointed in England by Her Majesty's Secretary of State. Most of these officers were trained in France, some in Germany ; but since 1885, the education of such officers has taken place at the Royal Indian Engineering College, near Windsor. The forest range is the unit of the present organisation, and the men intended for such charges, as well as those intended for employment in Native States or by wealthy native land-owners, are trained in the Imperial Forest School at Dehra Dun in the North-Western Provinces. Since the establishment of the School in 1878, 166 Rangers have been thus trained. The organisation of the Controlling Staff has been, as pointed out above, completed ; that of the Executive Staff, which must ultimately form the mainstay of forest adminstration in India, is now under the consideration of Government, and considerable additions to the existing numbers of Rangers, Foresters, and Guards will probably be made in almost every province.

The protection of the forests in which, previously to the creation of the Forest Department, no restrictions of any kind existed, was, as may be supposed, a matter of the greatest difficulty. Boundaries were defind where no boundaries previously existed, or at least boundaries which had never formed a restriction had, under the Forest Law, to be respected. Previously, anybody might go into the forest, cut down in a most valuable portion all young trees over any extent of forest he wished, kill the mature ones and make a bonfire of the whole, sow in the ashes, reap a crop, and similarly destroy another area next year. A man wanting covering leaves for cigarettes might cut down a tree without let or hindrance ; a cattle owner requiring more extensive pastures, might fire and re-fire the forest, till it became sufficiently open to yield a dense grass crop ; cattle and even goats might graze and browse in the midst of forest reproduction. All this had to be stopped.

As regards general protection, the laws, being new, had to be worked leniently. This has been done, and the progress reported from time to time is satisfactory. Where forests suffer, especially under excessive grazing, they do so more from rights granted and privileges permitted during the time of settlement than from subsequent breaches of forest rules. The greatest benefit conferred lies in the stopping of the above-described method of cultivation, locally known as *kumri*, *jhum* or *taungya*, in the Government forests of almost all provinces. This step affords, in the Central Provinces alone, protection to at least 5,000 square miles, which otherwise would have been rendered bare once in every fifteen to twenty years. In the protection of forests from fire there is still much to be learned and done, and in almost every province it is necessary to depend more on fire-tracing and fire-watching than on the help given by legislation. The law, while sufficiently stringent for reserve and even for protected forests, is quite inadequate to protect them from fires spreading into them from adjacent private forests and grazing lands and from open forests belonging to the Government, though the Burma Government has recently shown that most valuable results may be attained by insisting that the conditions of the law in regard to prairie fires shall be respected outside the forest areas. In all these classes of areas, fires intentionally lighted still often occur, and spread wherever the wind may carry them. This, apart from the mere protection of the Government forests, is probably one of the most important questions connected with forestry, and consequently with agriculture, in India. These annual fires are the main reason of the barren condition of most of the Indian hill ranges, and are closely connnected with distress and famine. Many prejudices will have to be overcome in order to check this evil, and it will take the full power of Government to do so.

In the meantime practical steps have been taken to prevent the spread of external fires into the more valuable Government forests. During 1891-92, 24,000 square miles were thus protected

from fire, at a total cost of Rs. 2,42,000, and the following table gives a *résumé* of the work done:—

Results of fire-protection in the forest circles administered by the Forest Department.

Circles.	Total Number of Acres.			Total cost.	Cost in pies per Acre.	
	Attempted.	Failed.	Protected.		Attempted.	Protected.
Madras Presidency ..	2,941,676	170,433	2,771,243	45,318	2·9	3·1
Bombay * " ..	6,620,160	1,233,289	5,386,880	16,571	0·5	0·6
Bengal	1,264,115	256,420	1,007,695	12,492	1·9	2·4
North-Western Provinces and Oudh	1,741,038	61,797	1,679,241	48,714	5·4	5·6
Punjab	189,916	23,594	166,322	2,106	2·1	2·4
Central Provinces ..	2,476,395	135,008	2,341,387	52,191	4·0	4·3
Upper Burma	682,320	553,770	128,550	805	0·2	1·2
Lower "	320,867	3,338	317,529	31,344	18·8	18·10
Assam	730,556	88,556	642,000	19,483	5·1	5 8
Coorg	130,715	16,274	114,441	5,290	7·8	8 9
Ajmere	89,228	..	89,228	45	0·1	0·1
Berar	727,943	7,753	720,199	7,780	2·0	8·1
Total	17,914,920	2,550,223	15,364,706	2,42,189	2·6	3·0

* These figures are for 1890-91.

By fire-protection, the regulation of grazing, and the general protection of the forests, ample reproduction is ensured as a rule, after a shorter or longer period, in the more valuable forests of India, though, in some of the drier regions, areas thoroughly desolated and with unfavourable soil will resist improvment for the time being.

Most Indian forests are of a mixed character, containing only one or a few valuable species which repay the cost of working. Moreover, all age-classes are generally represented on the same area, and this necessitates working by selection (Fr. *jardinage*). It is self-evident that these facts make the problem of forestry—to secure a continuous yield proportionate to the stock on the ground without causing the deterioration of the forests—extremely, difficult. In previous times the work was carried on haphazard, or based sometimes only on an exceedingly rough valuation of the growing stock. As a rule, however, the demand and requirements for forest-produce were the only considerations by which the exploitation was governed, and no attention was paid to the potential capabilities of the forests. Of late, however, more pretentious working-plans have been made, and several provinces have

organised a division or staff for this work only. The working-plans made in the provinces under the Government of India are scrutinised and audited by the Inspector-General of Forests before they are passed by the Local Governments. The working-plans take special notice of all measures necessary to encourage and, what is infinitely more difficult in a mixed forest, to guide natural tree reproduction ; and they prescribe any artificial means—such as girdling of inferior trees, dibbling in of seed, etc.—that are required to assist natural regeneration of the species or admixture desired. The forests controlled by the Department are, however, by far too extensive, and markets at high rate are not at present sufficiently general and secure to permit of the extensive use of the more elaborate methods of European sylviculture. In special connection with the preparation of working-plans, the Forest Survey Branch of the Imperial Survey Department has been formed.

The exploitation of timber, at least of the more valuable timber, from Government forests, is carried out partly through the direct agency of the Department and partly by contractors. Of minor forest-produce, the most important at present are grass, hirda fruit (*Terminalia Chebula*) bamboos, cutch, cardamoms, catechu, and lac ; but there are many others of lesser value.

The estimated yield in timber and fuel, in cubic feet of all Government forests was as follows during 1891-92:—

	Timber.	Fuel.	Total.
	c. ft.	c. ft.	c. ft.
Bengal	7,260,725	21,495,028	28,755,753
N.-W. P. and Oudh. ...	4,204,645	7,673,285	11,877,930
Punjab	2,381,030	28,968,083	31,349,113
Central Provinces	1,756,433	6,760,265	8,516,698
Burma (Upper)	7,352,485	1,506,598	8,859,083
Burma (Lower)	11,773,094	2,802,034	14,575,128
Assam	2,246,290	2,608,988	4,855,278
Coorg	398,844	196,000	594,844
Ajmere	7,300	191,098	198,400
Baluchistan	6,122	152,588	158,710
Andamans	415,874	1,150,636	1,566,510
Berar	621,454	1,558,341	2,179,795
Madras	3,086,937	13,987,173	17,074,110
Bombay	6,842,524	26,422,016	33,264,540
TOTAL. ..	48,363,759	115,472,133	168,825,892

The following table exhibits information in respect of the sea-borne exports of forest-produce from India to foreign countries in 1891-92 :—

Articles.	Quantity in tons of 20cwt. in the case of Teak, cubic tons	Valuation at Port of Shipment	
		Total.	Per ton.
		Rs.	Rs.
Caoutchouc ... . Tons	467	11,72,370	2,510
Shell-lac .. .. ,,	5,514	60,67,924	1,100
Lac-dye ... ... ,,	2	2,500	1,250
Sandal Ebony and other ornamental woods	(Information not available.)	8,41,938	...
Cutch and Gambier ... ... Tons	9,853	31,72,992	322
Myrabolams ... ... ,,	39,540	39,36,902	100
Teak ... . ,,	48,190	47,48,517	99
Cardamoms ... . ,,	124	3,18,957	2,572
Total in 1891-92 ...	...	2,02,62,100	...
,, 1890-91 ...	.	1,77,40,556	...
Increase in 1891-92 ..	..	25,21,544	...

Arrangements have recently been made for the dissemination of information on these and other important Indian forest-products among the commercial community and other persons in Europe interested in the trade. Monographs on the more important products appear from time to time in the pages of the *Indian Forester*, and are subsequently republished in the series of penny handbooks issued by the Imperial Institute in London.

The financial results of Forest Administration in India have been as follows :—

Quinquennial periods.	Revenue.	Expenditure.	Surplus.
	Rs.	Rs.	Rs.
1864-65 to 1868-69 (annual average)	37,38,189	23,81,732	13,56,457
1869-70 to 1873-74 Ditto ...	56,25,693	39,89,632	16,36,061
1874-75 to 1878-79 Ditto ..	66,55,913	45,76,372	20,79,541
1879-80 to 1883-84 Ditto ...	87,84,514	56,07,652	31,76,862
1884-85 to 1888-89 Ditto ...	1,16,68,148	74,26,956	42,41,192
1889-90	1,53,03,572	80,12,518	72,91,054
1890-91	1,49,67,135	80,63,125	69,04,010
1891-92	1,53,63,706	86,23,852	67,39,854

(Extract from the Hand-book of exhibits of the Indian Forest Department, at the Chicago Exhibition, 1893.)

IV.—REVIEWS.

Report on the Botanical and Afforestation Department, Hongkong, for 1892.

This Report is short, but shows that there was a great deal of planting work going on as usual during 1892, for 295½ acres were planted up, 356,653 trees being used, chiefly '*Pinus sinensis*'. It is, however, fair to note that only about one half of these were transplants, the rest being sowings 'in situ'. The revenue from thinnings, etc., was 601 dollars—the expenditure is not given.

As usual, fire was the great difficulty of the year, for there were 63 fires, which destroyed 2,000 trees A system of registering graves was set on foot so that when John Chinaman performs his usual ceremonies at the graves of his ancestors and fires the forests, the forest officers may be able to lay their hands on the right person.

The '*Pinus sinensis*' seems very easy to grow,—perhaps it might be found to thrive in Southern India, near the sea, and we recommend its being tried, at any rate on the hills. It is a pity that the reports tell us so little of the system of work and about the treatment of the forests.

Forest Administration in Jodhpur, 1891-92.

The report on forest administration in the Jodhpur State for the financial year 1891-92, was written on the 13th December, 1892, and reviewed by the Musahib Ala, Marwar, on the 1st October of the same year! Since the initiation of Forest Conservancy in Jodhpur, Colonel Loch, Assistant Resident, has had charge of all forest matters, with Lala Daulat Ram Bhimbhat as Superintendent, but during the year under review the Department changed hands and was placed directly under the orders of the Prime Minister Maharaja Dhiraj. Col. Sir Pratap Singh, K.C.S.I., A well deserved tribute of praise is given to Col. Loch for his able supervision during these four years.

The area of the Jodhpur forests is 1,91,000 acres, or about 298 square miles; and the whole is under fire protection, though some two square miles were burnt during the year. The causes of these fires is thus stated:—

"Most of these fires were caused by people cutting grass and 'removing dry wood from the forests. The Minas and Bhils 'are so much addicted to smoking, that they can hardly work

'without smoking after every quarter of an hour. They make fire 'from flint and have tobacco and a "chilam" always on their person.

'In the Siwari forest fire came from Odeypore territory and 'burnt an area of about 34 acres. No fire took place in Sojat 'Range during the year, which is attributed to the scarcity of the 'rainfall and absence of grass and other inflammable materials 'from the forests. Moreover these forests are better protected 'owing to good management in the adjoining Government forest.

'Nearly all of the Odeypore forests were burning during the 'dry season and it was very hard work for the establishment to 'prevent those fires crossing into our forests.

'A very objectionable practice is in vogue among the Dak 'runners running from Bijapore to Odeypore territory. They 'have to run through the best part of the Behra Reserve during the 'night and instead of burning a lantern or other convenient sort 'of thing, carry dry Dhow wood torches in their hands. They do 'not apply rags or oil as is usually done with the torches but only 'beat into a brush one end of the Dhow stick and burn it dry. As 'they run against the wind, the sparks and hot cinders are 'scattered in all directions causing fire to a large area. The 'matter was brought to the notice of the Deputy Post Master-'General, Rajputana, and he promised to put matters right, but 'nothing has been done up to this."

The best plan in the Behra reserve would be to clear broad fire lines on either side of the road along which the dak runners pass.

The cost of fire conservancy in Jodhpur is 0·06 pies per acre, a wonderfully low figure. A long fire line was cleared between Marwar and Meywar and Merwara over 100 miles; and no charge for this appears in the accounts. The only cost is that of fire-watchers—nothing is charged for clearing and burning lines. Perhaps, as in Ajmere, the grass is so valuable that people gladly remove the grass free, and assist in burning whatever remains without payment—this shews how impossible it is to compare the results of fire conservancy in the various provinces, or to give them a figure of merit.

Owing to the famine, consequent on a scanty rainfall during two or three years which culminated in 1891 a very dry year, all the forests were thrown open to grazing of cows and buffaloes, and the lives of several thousand cattle were saved.

Natural reproduction is said to be a failure, as the seedlings which spring up during the monsoon are subsequently killed by drought, moreover the sheep and goats of the Grassias in several forests, destroy whatever seedlings are left. "They do not mind 'the authority of the Raj, nor do they abide by the Forest Rules;" but it appears difficult to eject them. Are they criminal tribes?

Fodder grass is cut and pressed into bales for use in the State stables, and for the Imperial Service troops, but in 1891 they experienced great difficulty in supplying their wants, and had to import grass from Ahmedabad and Alwar.

Two of the range officers were trained at the Dehra Forest School, and a third has since passed successfully through; the Superintendent himself received the Ranger's certificate of the School—in 1882.

The financial results show a surplus of Rs. 14,779, which is an increase on that of the previous year, chiefly owing to exceptional sales of grass.

A. S.

Forest Administration Reports for 1891-92 for the N. W. Provinces & Oudh, Coorg and the Forest Surveys

There is not much for us to say about the Reports for the North-Western Provinces and Oudh. There is a note of dissatisfaction pevading those of all three circles; insufficient staff, frequent transfers, working plans not carried out, demarcation not properly done, excessive privileges and consequent deterioration of the forests, over-grazing and deliberate incendiarism are some of the features of these reports which make it reasonable to think that the forest arrangements are not as satisfactory as they should be, though from the remarks made by Conservators, it would not seem that there is any want of proper agreement between them and the Revenue officers. Probably, the facts are that old arrangements of a period before recent developments of policy came in have become crystallized, and that the greater accuracy in settlement work, working plans and other important matters which is now insisted on (and rightly so) by the Government of India, is difficult to introduce in a province, where so much of the progress made has depended on the necessity for great caution in developing a department which is unpopular with the people and often misunderstood by officials. The most important part of the Review by the Government is para. 4, which we reproduce.

"In paragraph 3 of their letter No. 138 F., dated 5th 'February 1892, the Government of India asked that in future 'the reports should contain full information regarding all forest 'and pasture lands still at the disposal of the State, but not yet 'brought under the provisions of the Forest Act. The Conservator 'of the School Circle reports that he has, as yet, been unable to 'collect the necessary information for his Circle, but promises 'that the subject shall receive his attention during the present year. 'In the Central Circle there are approximately 3,428 square miles 'of forests, the property of the State, not under the charge of the 'Forest Department. It is not at present deemed necessary or 'advisable to formally reserve these forests, which are spread over 'more or less inaccessible hills. It has however been brought to 'the notice of Government that the forests have in some cases

'suffered considerably from khil cultivation, and in the interests 'of the villagers it has been decided to bring portions of those 'forests, where the results of the fluctuating cultivation have been 'most serious, under the provisions of Chapter IV of the Forest 'Act. The rules which it will then be possible to introduce will, 'it is trusted, suffice to prevent the destruction of the forests 'actually concerned, and the action taken will serve as a warning 'to the villages in the rest of the Division, and make the people 'more amenable to the instructions of the District Magistrate. 'The Commissioner of Kumaun has still under consideration the 'list of pattis in which action is most urgently required. The Con-'servator of the Oudh Circle reports that in the Lucknow and 'Fyzabad Civil Divisions there are 16 square miles of forests, the 'property of the State, managed by District Officers. He suggests 'that these areas should be reserved, but be left under the manage-'ment of the district authorities. This question will be considered 'when the report by the Board of Revenue is received on the 'questions raised in the Circular of the Government of India, No. '17F.-105, dated 15th July 1891, with regard to the classifica-'tion of waste lands into forests, fuel and fodder reserves and 'pasture lands. It will then also be possible to give full informa-'tion as to the waste lands still at the disposal of the State, and 'to arrive at a decision as to their future treatment"

There can hardly be, in the North-Western Provinces and Oudh, much waste land the property of Government, except in the Hills and the plains districts which adjoin them ; but it seems to us that what there is ought to be made into permanent estate as was recommended by the Government of India, rather than that it should be treated in half measures under what is, by most people, admitted to be an unsatisfactory Chapter of the Act, that relating to Protected Forests.

The point of greatest interest for our readers in the report of the Central Circle, are those of (1) the natural reproduction of chir in forests open to grazing and (2) the experiments made in the quantities of the yield of 'Katha.' On the former subject it is said :—

"Mr. Hobart-Hampden advances the opinion that the con-'tinual restriction of grazing in the chir forests is not a *sine quâ* '*non* for effectual natural reproduction, and would merely close 'such areas as are in the first stages of natural regeneration. This 'may no doubt be accepted where the system of regular regenera-'tion fellings is in vogue ; but where selection fellings are the rule, 'as at present, the forests are more or less always undergoing 'regeneration and in all stages. He would, however, establish 'a system of age classes by the French "*Mode des eclaircies*," 'but the gist of his remarks lies in the advocacy of grazing 'after the young growth is sufficiently advanced to be out of 'danger, as a preventive, or at least a check on the severity of fires, 'and in this regard the remarks are worthy of attention."

Our own experience points very much to the same conclusion : up to a certain limit, grazing may be beneficial in forests of the long leaved pine, both as allowing the seeds to reach the ground more easily and as diminishing the risk of fire which is absolutely incompatible with proper growth and proper reproduction. It is somewhat strange to find forest officers advocating 'careful firing' under any conditions but this may be seen in the fire report of the School Circle, where however it may also be noted that the Conservator does not agree and apparently holds more nearly the same opinions as Mr. Hobart-Hampden.

The 'Katha' experiments are thus described :—

"Experiments were carried out in the Kumaun Division 'with a view to ascertain the girth at which the khair tree gives 'the greatest yield of katha. An area of 64 acres in Guliapani 'was felled, and the following statement gives the results, which 'go to show that the smaller the girth the greater the yield, and 'point to coppice at a young age as the most profitable method of 'obtaining the raw material :—

Girth in feet.	No. of trees felled.	Cubic feet solid of utilizable portion, including bark & sapwood.	Yield of katha.		Yield per cubic foot.
			Mds.	Seers.	Seers.
1½ to 2	150	306	4	25	0·60
2 to 2½	150	478	6	10	0·52
2½ to 3	105	464	6	3	0·52
3 to 4½	73	425	5	8	0·49

"Bark and sapwood not, however, being utilizable in the 'manufacture of katha, the difference in the yield in favour of 'smaller trees is actually greater than that shown in the statement. 'This result, which is entirely opposed to the present idea that 'trees under three feet in girth are unfit for katha, cannot, how-'ever, by any means be accepted as conclusive, and further experi-'ments might well be undertaken, including experiments to 'ascertain the yield of coppice shoots."

We shall be interested to hear the result of the coppicing of 'Khair,' a tree whose reproduction presents so many points of difficulty. So far as we have seen, in our own experience, khair coppices, if at all, only very badly on the river-bed lands where it is usually found in the Sub-Himalayan Forests.

In the Oudh Circle Report, the most noteworthy matters are, as usual, related to the grazing question. On this Mr. Eardley-Wilmot says :—

"The percentage of divisional areas closed to grazing is too 'small, and there is apparently no reason why, except in times

'of scarcity, grazing should be permitted to any cattle but those 'the *bonâ fide* property of the tenantry who are resident within 'such distance as renders the daily journey to and from the 'forest possible. If this ruling were strictly enforced, the area of 'the grass lands outside the tree forest would in many places be 'ample to supply grazing to these herds and tree growth would 'have some chance of improvement. It was never intended that 'the State forests should be grazed over by large herds of cattle 'which are brought from long distances and settle within or in the 'vicinity of the forests; nor have the privileged villagers the 'right to collect their cattle at convenient centres from whence 'to graze over the forest at their pleasure. The department is to 'blame in having permitted the settlement of outsiders in forests 'already fully burdened with privileged grazing and also in not 'insisting on the privileges being administered in the spirit they 'were granted, which is on the assumption that a grazing ground 'is of no value if beyond a distance of three miles. The matter 'can readily be adjusted by defining the forest blocks in which 'privileges can be enjoyed, a detail which should not have been 'omitted from the original notification. This question and that 'of extending the area under tree growth which may be closed to 'grazing will be referred to the District Officers, one of whom, 'the Deputy Commissioner of Bahraich, endorses the annual 'report of his District Forest Officer with the remark that "more 'forest should be closed to grazing."

And a few paragraphs later he describes the result of protection in the following words :—

"Divisional Officers agree in the excellent natural reproduc- 'tion present in protected areas and its hopelessness in areas open 'to fire and grazing. The writer of this report visited the Oudh 'forests this season after an absence of nearly 12 years and can 'testify to the excellence of reproduction and growth in those 'forests which have been rationally treated. Areas which in 1888 'were open to grazing and stocked with stagheaded or unhealthy 'trees springing from a bare and hard soil, are now covered with 'luxuriant undergrowth of sal and other species, the timely exclu- 'sion of cattle having saved such forests to the State; just as 'the continuance of unlimited grazing in other forests has resulted 'in further deterioration and must end in their ultimate destruc- 'tion.'

The financial results of work in these Provinces were for the year.

	Rs.
Revenue	17,31,513.
Expenditure	9,55,200.
Surplus	7,76,293.

The outturn of timber was 4,205,000 cubic feet, and that of fuel 7,673,000 cubic feet.

The Report is accompanied by an excellent and useful map of the forests of the Central Circle.

We have read the *Coorg* Report with some sadness. It was the late Mr. Foster's first report and abundantly shews his great interest in the province and its forests and the loss which the Department has sustained in his sad death at Cannanore

We should have liked to know what the reasons were which led the Chief Commissioner to decide that the Coorg forests were not legally 'Reserved forests' under the Act and whether in order to introduce a forest settlement under Chapter II, the old notifications had to be cancelled and new ones issued. However, it can hardly be denied that the new settlement is a great advantage and that it is being speedily carried out. In the work of the year only one claim remained unsettled, a 'right of way,' but for some strange reason or other our Indian Act has no provision for settling claims to 'right of way!' We do not quite understand the system of demarcation by means of 'pits in pairs' and wish some Coorg officer would enlighten us. We badly want a general account of the various systems of demarcation practised in India.

Mr. Foster's account of fire-protection will, we think, be read with interest. He says:

"Before giving a detailed account of the fires which have 'taken place during the past season, I will describe the system of 'fire protection which has been in force in Coorg up to and including 1892. No "fire lines," as so understood in the Central Provinces, were ever made. In the case of exterior fire lines one, and 'in that of interior, two, "check" lines, a few feet broad, were 'roughly cleared. The forest in between check lines or between 'it and the boundary was not touched. Fire was then applied to 'the intervening growth and what wood, grass or bamboos were 'combustible were burnt.

'The drawbacks to this system are many. In the first place 'owing to the standing vegetation being green, much of it fails to 'burn. Then, as the trees and bamboos are still standing on the 'so called fire line, it is very soon again covered with a dense 'carpet of leaves and for the purposes of isolation of the forest 'from outside fires, is absolutely valueless. As the "line" is 'covered with trees, bushes and bamboo clumps, it is impossible to '*sweep* these leaves off. They, therefore, have to be burnt, and as 'the leaf-fall continues all though the year, this burning has to be 'repeated especially as much of the grass, &c., fails to ignite in the 'first burning as already stated. Thus, firing the lines in the dry 'season, when everything round is like tinder and high winds are 'blowing, lays the forests open to a very great danger, and these 'fires are all the more liable to get out of hand and spread into 'the forest inasmuch as, owing to the presence of bamboos and 'brush wood on the lines, it is impossible to move about and

'control the fire. Thus many fires are caused by this line-burning 'getting out of hand.

'In the Central Provinces, the fire line is always cleared of all 'trees, bamboos and brush wood. There are two ways of dispos-'ing of the grass.—Either two check lines are cut one on each 'edge of the fire line, the grass thus cut thrown into middle of the 'line, and then the standing grass burnt—or the grasss is cut 'over the whole breadth of the line and spread out. This latter is 'the better, through perhaps the more expensive way,—as the cut 'grass dries quickly and is combustible, while as yet the surround-'ing forest is green—but under either system the first principle 'is to have the fire line clear of all tree, bush or bamboo growth.

'I am now gradually clearing the fire lines. I tried to get 'them ready before the season of 1892, but was unable to do any-'thing more than a little; owing partly to want of labour and 'partly, I am sorry to say, to obstruction on the part of my 'subordinates, but work is going on now and I hope when the 'time comes to burn the fire lines next season they will be in a 'proper condition."

The Government of India, we are glad to see, support the Deputy Conservator in his endeavours to improve the fire-protection work and agree with him that until it is more satisfactory, it will not be politic to relax the rules prohibiting grazing during the hot season, proposing also that where incendiarism is rife, some really deterrent punishment such as the withdrawal of Rights and Priviledges should be applied. We can only regret that it can no longer rest with Mr. Foster to carry out the improvements he has so ably started.

The accounts of natural reproduction in Coorg are as depressing as those of fire-protection, the failure of the latter being the chief cause of that of the former. In regard to artificial reproduction, some interesting notes are given. Sandal sown in pits was not successful and apparently it has been found that, as our own experience bids as agree, sowing in the forest among bushes is more likely to succeed.

Financially, the results of the year were good :—

	Rs.
Revenue	1,82,897
Expenditure	86,860
Surplus	96,037

The chief feature of the Report of the Forest Survey Branch for the year ending September 30th, 1892 is the series of excellent sketch maps shewing the progress of work in the various and very scattered localities where surveys are going on under Mr. Reynolds' excellent supervision. Bashahr in the Punjab; Raipur, Bhandara and Jabalpur in the Central Provinces; Goalpara in Assam; and Tenasserim in Burma, are the areas in which work was

in progress and in all of them it has been satisfactory, cheap and creditable. The Surveyor General summarises the work done as

Topographical survey	1,586 square miles
Area triangulated	2,357 „ „

The cost of the work done came to Rs. 53.4, Rs. 46.9, Rs. 42.3 and Rs. 86 respectively per square mile of 4-inch work in Bashahr, Central Provinces, Assam and Burma respectively; while the 1-inch work in Bashahr came to Rs. 13.7. The total expenditure of the Department came to Rs. 1,24,649.

V.—SHIKAR AND TRAVEL.

Chakla Drogmula.

Perhaps the most picturesque part of the Kashmir plain is the valley of the Lolab or Pohru River; the former name appretaining only to the upper reaches of the river. Immediately below the outlet of the Lolab valley, the tract of land on this river is called the Drogmula Chakla ; the principal villages on the left bank being Drogmula itself and Kandi, a few miles lower down, some three miles in a direct line from the river bank. Of all the pretty places in this beautiful country,probably none surpass and few equal those to found at and around Kandi. The country between the village and the river is gently undulating like many parts of Devonshire ; here, a stretch of verdant grass, there a ploughed field ; while insterspersed are small ravines containing thickets of fruit trees of all kinds such as pear, plum, apple, quince, cherry, hawthorn, etc., all of which are now (May) in full bloom presenting a glorious spectacle of hundreds of trees laden with snowy blossoms. When the fruit is ripe, the bears come from the range above, and, in consequence, all these trees are protected and the place is called a state shikargah. This plain, so to call it, ends almost abruptly at the foot of the range which divides the Lolab from this valley. The elevation of Kandi is somewhere near 5,500 feet, while the range rises to more than 3,000 feet above this. It takes a wide circular sweep from Drogmula, enclosing the Kandi lands, then a point juts out into the plain ; again another backward sweep round the village to Túrús till it finally abuts on the river some 3 miles further down at a place called Natanusa. In a recess of the first or Kandi curve, at the very foot of the range, is a most beautiful nook in which is a famous spring known as Ladhu Gunga and here dwell a number of Ladhus ; here also

come many others from afar to drink the sacred water. The pool itself is quite a small one, having stone walls on all four sides. Ferns, grasses and flowers grow in the interstices of the stones, while all around are pretty bushes of Parrotia, hawthorn, wild rose, yellow jessamine, etc., and a little above, on a gently sloping bank, stands a magnificent deodar, towering up to perhaps 150 feet above the ground; between the bushes is a lovely green sward covered with wild strawberry and other flowers, the whole forming a peaceful scene of rural beauty that could hardly be surpassed in any country in the world. At about half a mile from this spring, is another of smaller size, known as Narin Nag; this also is protected by a stone wall on all sides, the stones carefully cut and laid and of large size. This spring is surrounded by huge poplars, a very fine chinar, and a number of fruit trees, among which is a copse of white-heart cherry trees, perhaps fifty in number; in Kashmir these are called *gilás* and are much prized, the fruit is of excellent flavour but hardly as large as the English cherry. It is my good fortune to be now encamped close to the Ladhu Ganga while engaged in the work of demarcating the forests in this Chakla. I usually start early in the morning and work my way along the edge of the forest, putting up marks which are replaced during the day by posts, supported by dry stone pillars. The work goes on till breakfast time, when usually my wife and daughter bring breakfast to some point agreed on, where I join them; we generally choose a spring or the bank of a pretty rivulet and many a pleasant hour have we spent thus. The little one is allowed, to her great delight, to paddle in the stream as she calls it; and many are the curious things she finds in the water. A few leeches, same beasts exactly like shrimps of small size, curious cricket-like insects and others come waddling out from under the stones as she turns them over. After an hour or so, we return to the tents for the day, till the heat is past, for it can be very warm on a bright day. In the afternoon, if we do not play Badminton, for which we carry the implements with us, we saunter out into the forest and hunt for morels, known here as "guchi" or "kanguchi;" these are very plentiful just now and we eat them in all sorts of ways, as an adjunct to meat and also in the shape of "toasts" and very good they are; there are two kinds, one of which has the head attached to the stalk and the other in which it is free, as in a mushroom, and shaped like a closed umbrella. One day I found *Ophioglossum vulgatum* and on asking a Kashmiri if he had any name for it, he at once said *chouchru*, adding that it was excellent eating boiled like a *sag*. Now, I always try new things that are found in the wilds, for they often stand one in good stead; and this puts me in mind of an incident that once occurred to me. I was at a Mess in the hills and happened to observe that the young fronds of the *Diplazium polypodioides* (called *Kisror* in Chamba) were very good eating and much resembled spinach; at this several of the yonng fellows

snorted and one said he never partook of native vegetables, a true British conservative he! Their Colonel, however, like myself, was in the habit of trying new things, so he and I concocted a mild sell for the youngsters. I left the place next day and shortly after happened to visit a forest near, where I was able to get a good basketful of the young curled heads of the fern; I sent a man off post haste to the Colonel and awaited results. The sell was a complete one, the fern was prepared like spinach and all the young fellows ate it with gusto, some noticing nothing, others observing they had no idea spinach was to be had so early; so much for never tasting native vegetables. Some of the *chouchru* were cooked for us by the servant of one of my officers and we found them very good eating, so we turned to collecting ourselves. At first we could find few leaves, but now they are very abundant; our ordinary haul is 1½ lbs. in an hour; it grows largest in the shade of bushes or tufts of grass and some specimens were 13 inches long, without the roots which are very deep down. I have found this fern in Chamba, but only a few plants here and there, but in this place they are in thousands everywhere. One day, while gathering them, I suddenly came upon what I have been seeking for years, a *Botrychium*, which I once found in Chamba long ago, at least I think it is the same; leaves very much cut and the fertile spike springing from the base of the sterile portion, neither above nor below. I found two specimens about a foot high, of course quite unripe, spike well developed, and suppose it is *B. virginianum*. As yet all ferns are too soft and unripe to begin collecting, but they are at their most beautiful stage, especially *Adiantum venustum* which is far prettier now in its delicate yellow green stage, than later on when it has ripened into a dark sombre shade. The Ladhus are very friendly; they are Kashmiri pundits and very quiet and unassuming, we often exchange a greeting with the head man, a smiling genial old gentleman. He one day asked if he might send some cooked vegetables and I assented and shortly afterwards an assortment appeared, in six little brass cups, mostly cooked, (not the cups,) but one cup contained a very tasty little condiment of uncooked green stuff pounded up with milk; since then he often sends up a supply. They possess many cows and send us delicious milk and we, in turn, give them cream butter which they much appreciate; they have a garden in which they grow herbs of sorts and I intend giving them some good seeds. They cultivate some land around the spring, but, as they live by charity and have to feed many travellers, the land revenue is paid for them by subscription among the neighbouring lambardars. This is a great place for walking sticks, the barberry (*B. aristata*, I think) is common, and many fine sticks with beautifully streaked bark are to be had, but a straight one, with a really good head, is only to be got now and then and is a great prize. Apparently this is called *chitra* in the Punjab, which is the name

of the *Staphylea Emodi*, which also has a striped bark and probably from this fact, the natives mistake one for the other. The Kashmiri name for the barberry is something like *Lukutsing* but it is hardly possible to render their words in English as the pronunciation is so curious, *ch* being sounded like *s*.—*Cotoneaster* (*liun* or *lin*) is plentiful here but good straight sticks with root heads are few and far between. *Parrotia Jacquemontii* is one of the commonest bushes of the undergrowth, it was in flower early in May. Just now there is a plague of small caterpillars which are a nuisance in the jungle, as the hairs produce a stinging eruption like nettle rash, if they come in contact with the skin. The small red plum called *aleucha* is already of a good size, so it is probable the fruit season will be an early one. The voice of the cuckoo is heard in the land, indeed he calls all day long, the golden oriole has appeared and the long tailed mag-pie is common; there are crows, but he is a very mild bird compared with his impudent brother of the plains; this is a smaller type with a grey head, and his cry is a feeble sort of chirp not the aggravating caw of the other, nor is he in the least a forward bird in his habits.

Near Ladhu Ganga, the spurs of the range slope downwards very sharply into the valley, but near Kandi village the descent, though steep in the upper levels, is a very gentle one lower down, from the edge of the forest through the fields to the flat land below; a horse can be ridden up several of the spurs for a good distance and from here there is a most magnificent view. Let me try to describe it, through word pictures are hardly in my line. The background is formed by the great Punjal Range on the left, and directly in front, the Kazinag peak 14,400 ft., stands out clear against the sky; the summits covered with glittering snow and the base dark with pine forest; nearer, lie range after range of dark blue hills, the beautiful grey mist bathing their feet; nearer still lies the peaceful valley, carpeted with verdant grass and dotted with trees of all the delicate shades of green, while from among them, peep the picturesque farmsteads of the dirty Kashmiri. To the left in the middle distance, several spurs trend gradually down into the valley, their hue the dark and sombre one of the deodar-clad hill; the outline sharply defined against the more distant mountains, while on the right, where the plain is more open, are seen the dark clayey fields, the "bit of colour" dear to the eye of the artist. In the immediate foreground, a little to the right, stands a clump of deodars the branches clear and distinct in every detail, against the setting sun which bathes the scene in golden splendour. "Where every prospect pleases and only man is vile."

J. C. McD.

(*To be continued.*)

VI-EXRACTS, NOTES AND QUERIES.

The Forest of Ne-Ha-Sa-NePark in Northern New York.

From a report recently prepared by Mr. Gifford Pinchot, on the condition of a large forest estate in the Adirondacks, we are permitted by the author to print the following extracts, which are of general public interest, as Mr. Pinchot's conclusions and suggestions with regard to the management of the property are applicable to similar forests in many of the Northern States.

"Except for local variations and the greater proportion of the soft timbers in the western and northern part", Mr. Pinchot writes, "forest over the whole park is approximately the same. 'The high ground is covered by a magnificent growth of hard-wood 'timbers, thinly interspersed with spruce. Beech is here the most 'common tree, with birch and maple closely second. The swamps 'and low grounds are chiefly occupied by balsam, tamarack, 'hemlock and white pine. To these, which have been mentioned 'in the order of frequency, are to be added in the same order, 'cherry, poplar, cedar and ash. Spruce and pine are at present 'the most valuable timbers. It seems likely that in future birch 'will be the most important tree. The silvicultural value of the 'soil has been reached by the accumulation of mould from the waste 'of many generations of forest-trees. The ground itself is rocky 'and not rich, and its sustained vigor depends entirely upon the 'preservation of the humus or duff, with which it is covered almost 'everywhere, sometimes to the depth of six feet. Humus dis-'appears gradually upon free exposure to light and air, and may be 'entirely consumed by forest-fires. Hence fire and reckless 'cutting are especially destructive to the Adirondack forests, 'entirely apart from the important loss which they occasion in 'standing timber and the growth it would have made during the 'years in which the burnt area is slowly reclothing itself with 'forest."

Want of space compels us to pass over the description of many of the trees found in the Adirondack forest. Of the white pine, he says that "it grows on the West and South-West slopes of the ridges and on the borders of swamps in mixture with spruce and balsam. It would be exceedingly advisable, how ever, to defer this removal at least in part, until the reason can be discovered why the enormous number of cones produced by this tree do not result in a plentiful young growth. It is possible that the conditions favourable to the germination

and growth of the pine seed may by found to be producible at very little cost, so that it may be possible to assure a large proportion of this valuable timber in the next crop."

In discussing the age of the trees found in this forest, Mr. Pinchot points to the fact that "young trees are almost always 'seriously retarded in their growth by the heavy cover of the 'older specimens. For this reason, the rings of annual growth 'formed during early life, are much closer together than the later 'ones. In endeavouring to count the rings of stumps standing on 'the right-of-way near Lake Lilla, I was often unable to separate 'those of the first fifty or one hundred years, even with a glass. 'I found no maple or birch whose inner rings could be counted, 'and but one beech. This tree was twenty-eight inches in diameter 'at four feet from the ground, and somewhat over two hundred 'years old. A hemlock of seventeen inches diameter on the stump 'was two hundred and ninety two years old. Spruce stumps, on 'which all the rings were far enough apart to be counted, were 'also exceptional. One butt log, with a diameter of seventeen 'inches, was two hundred and eighteen years old. This tree had 'evidently been stunted by the shade of older hard woods. It is 'remarkable that the finest spruce, that on the hard-wood ridges, 'must have passed through this period of repression before making 'its principal growth. By cutting away the merchantable hard 'woods, which are suppressing the young spruces over a large 'portion of the park, their rate of growth may be enormously 'increased. For example, two young spruces, eight inches in 'diameter, which had grown among others of the same age, and 'therefore, with a comparatively abundant supply of light and 'air, were but fifty-two and sixty years old, although almost twice 'the diameter of another tree one hundred and twenty one years 'old.

"The power of natural regeneration of all the trees which 'I have mentioned, with the single important exception of white 'pine, seems to be amply sufficient for all the purposes of forest-'management. The presence of this reproductive power is of the 'greatest importance. It puts aside at once the difficulty and 'expense of planting and insures a steady improvement in the 'condition and value of the forest.

"The vigorous and abundant young growth makes it possible 'to remove mature trees without injury to the forest, and under 'proper handling will insure the continuance of its productive 'power. The constant character of the forest, even in its changes, 'lends itself easily to the needs of forestry, while the presence 'everywhere of mature trees over the young growth makes it 'possible to cut and yet increase the annual growth of wood from 'year to year. This steady increase in the value of the forest under 'forest management is one of the strongest reasons for its intro-'duction. Forest management will add constantly to the propor-'tion of valuable timbers in the forest, by judicious cutting

'without a corresponding abatement in the amount of lumber, 'produced. In other words, for a few years, the forest will yield 'slightly more under ordinary lumbering than it will under forest 'management, because, in the latter case, greater care is used, and 'many trees which would otherwise fall at once must be allowed 'to stand. After that time the revenue from forestmanagement 'will surpass that from lumbering, and will go on increasing indefi-'nitely, while the returns from lumbering methods will as steadily 'diminish. The profits will certainly pass their lowest point during 'the first twenty years, and probably during the first ten. There-'after, they will rise with the rise in prices and the growing 'productive capacity of the forest. Timber-land as productive as 'this, as safe from fire, and as accessible to the centres of consump-'tion by rail and water, is, in my judgment, one of the best of 'long investments".

Mr. Pinchot recommends that this forest should be carefully examined and mapped with a working plan made "with the 'supposition that it will be best to cut over the same ground a 'second time at an interval of from twenty five to forty years." 'Then he would "divide the forests into as many parts as there 'were years in the period decided on, and assign the land most in 'need of cutting to the first year, the second to the second year, 'and so on ; but in such a way as to make the annual production 'of timber as uniform as possible."

The forest managed in this way is expected "to yield a 'steady annual return, which ought to constitute a fair rate of 'interest on the investment," and "to increase the value of the 'forest by favoring the better kinds of trees, so that the market 'value of the land, as well as the return from the lumber, would 'increase steadily from year to year".

In conclusion, Mr. Pinchot discusses Lumbering *versus* Forestry as follows :—"The statement is often made that it is possi-'ble to lumber the same land a second and then a third time at 'intervals of fifteen or twenty years, and get as good a cut from 'it as at first. In exceptional cases this is true. The probabilities 'are, however, that the second and third cuts were as good as the 'first in a pecuniary way, and not otherwise, since during the years 'which intervened, the diameter of merchantable trees has steadily 'diminished, while the price of lumber has increased. Forestry 'provides not merely for sustaining the proportion of the more 'valuable woods, but for increasing it.

The ordinary methods of lumbering are exceedingly careless of the life of all the young growth which may happen to stand about the old trees. Such carelessness is not only destructive of the future value of the forest, but also increases the danger of fire by the presence of a quantity of dry saplings which forests management would have allowed to grow. Young green trees are the greatest protection a forest can have against the spread of

fire. Hence forest-management tends distinctly to keep fire out, as compared with the methods of ordinary lumbering.

"Lumbering yields a slightly larger revenue than forest-'management, but in the end falls far behind it. It increases 'the danger from fire, tends to deprive the forest of its more 'valuable timber and lowers its capital value. Forest-management 'does none of these things".—(*Garden and Forest.*)

Date Planting in Australia.

Information lately received shows that the experiments in tree-planting, in the interior of the colony undertaken by the South Australian Government, have proved successful. A special feature is the splendid condition of the date palm; these trees are already bearing fruit. Some of them were planted by Mr. Ednie Brown, late Director-General of Forests, eight years ago. Such a result is specially satisfactory when it is remembered that it takes longer than the period named for such trees to bear fruit in Egypt and India. The trees were planted at a place called Hergott Springs, situated upon the overland railway line, and were subject to the overflow of a salt-water bore. The fact that these trees will grow in a brackish country is looked upon as important in this country, where so much land is of this nature. Something like 10,000 date seeds have been planted in South Australia by supplying exploring parties with the fruit. It is the intention of the Forest Department of this colony to experiment by sowing the seeds at the different bores which have been carried out by the Water Conservation Department. The experience of South Australia proves that trees will flourish when sown artificially. In some experiments which were carried on at Mount Herbert it has been proved that, upon poor soil, some 350 trees per acre had been reared. With proper application and the selection of suitable trees it would, it is stated, be quite within the bounds of possibility to reforest country which is now quite barren. The experiments made last year upon the commonage at Wilcannia are reported as having succeeded satisfactorily. Notwithstanding that the trees were planted late in the season, and that no rain fell for five months, a very fair percentage of them survived. The planting is to be continued, and something like 10,000 or 15,000 trees will be put out as opportunity offers. Experiments in the same way are also likely to be made at Bourke, Wentworth, and Broken Hill. There are in the state nurseries here some 200,000 trees available for distribution, and the planting of them out can be proceeded with from the present time up to August. (*Pioneer.*)

Planting of the Sandhills on the Sea-coast of Norfolk.

Holkham Sandhills, the property of the Right Honourable the Earl of Leicester, K. G., were rabbit warrens until the year 1850. They extend about three and a half miles along the Norfolk coast, from five to twenty five chains wide, bounded by the German Ocean on the north, and on the south by rich pasture land reclaimed from the sea, dating as far back af 1660, when the first enclosure was made. These hills are held together by a plant called *Psamma arenaria*, which has a strong creeping perennial root, with many tubers at the joints about the size of a pea. It is planted and encouraged on the Norfolk coast to aid in fixing the sand against the action of the wind and tides, which it does in a remarkable manner. The "marrum," as it is locally called, or bent-grass, is considered of so such importance that there are severe laws to prohibit its being destroyed. Mats are made of it, and it is also used as thatch.

Elymus arenarius, the sea lyme-grass, a strong, rough, glaucous plant, common on sandy shores, is also frequent here, and answers the same purpose in fixing the sand as the "marrum." In analysing the soluble matter afforded by this grass, Sir H. Davy found it to contain more than one-third of its weight in sugar. It is not, however, eaten by any of our domestic animals.

About 1850, I sowed several kinds of pine seeds on the sandhills, putting some of the seeds in small pellets of clay and inserting them in the sand, and in vaious other ways. I did this for two or three years in succession, but it ended in failure. I then planted a few plants of well established *Pinus austriaca*, *P. Laricio* and Scots fir, and had them thoroughly protected from rabbits, never thinking they would do much good in the pure sand, but I was agreeably surprised at the end of the first season. The plants all lived and made one or two inches of young wood, and seemed healthy; the second year they did better, when I drew the Earl of Leicester's attention to the matter, and he was so satisfied with the growth of the trees that were planted that he at once set about destroying the rabbits, and planted a small portion of the hills every year till the whole was completed.

The east end of the hills, nearly two miles in length, which was only partly planted previous to 1875, is a very thrifty young plantation, not only being a shelter for the adjoining pasture, but forming a grand and peculiar feature in the landscape, and the trees doing much better than the most sanguine could expect.

Mr. Munro, the Earl of Leicester's intelligent forester, writes to me about this division of the hills, and says :—"When he came to Holkham in 1877, the trees in many cases were very good, but the tops of the *Pinus Laricio* were very much cut with the northerly winds and blowing sands. He at once commenced planting the tops of the hills, principally with *P. austriaca* and a sprinkling

of *P. austriaca.* When these got hold and began to get up, the *Laricio*, which were cut by wind, began to improve, and by 1882 a very decided improvement was visible. Since then, seeing the progress the plantations made, he went on extending them, until the area planted is now double what it was in 1882."

The proportions in which the plants are used are :—

Pinus Laricio,	50 per cent.	planted 8 yds. apart.	
„ *austriaca,*	25 „	5 to 7 yds. apart.	
„ *sylvestris,*	20 „	„	„ „
„ *maritima,*	5 „	„	„ „

Let it be distinctly understood that the plantations are ornamental, and are not planted for profit. hence the distance between the trees, giving plenty of room for developing their laterals. The *austriaca* and *maritima*, being on the higher and more exposed situations, and fully exposed to every storm from the German Ocean, are planted 5 to 7 yards apart, as they cannot possibly make the same growth as the *Laricio*, which are more sheltered. The *Laricio* are now in many cases 30 to 35 ft. high, their lateral branches covering an area equal to a circle of 8 yards in diameter, and are full of health. The Scots fir and *austriaca* are making a proportionate growth. When at Holkham last spring, Mr. Munro had just finished planting a large area of the West Sandhills, and, notwithstanding the previous cold and unpropitious winter and spring, I only saw a single dead plant, which reflects great credit on Mr. Munro's management.

Altogether this is a most interesting item in forestry, but I am not aware of any notice of this or similar undertakings having been mentioned in any British work on forestry. Professor Wagner, however, writing to the Prussian Minister of Agriculture, and recommending to him the cultivation of *Lathyrus sylvestris*, a strong perennial-rooted species of the Everlasting Pea tribe, for the immense area of barren sandhills along the coast of Northern Germany, points out that it would form a far superior means for bringing these vast wastes under profitable and permanent cultivation than the planting of pine and fir trees. Little faith was, however, put in that statement, until its correctness had been visibly proved on a large scale by Imperial Privy Councillor of Commerce, Otto Kuchnemann, of Stettin, Pomerania, Germany, who had for many years, and at heavy expense, endeavoured to grow on his sandhills pine and fir trees, but had failed to succeed, the young trees being partly smothered or uprooted by the evershifting sand, and those surviving were vegetating so weakly that the attempt was tantamount to failure. Now a flock of sheep is kept on the *Lathyrus* fodder grown on the identical sandhills where six years ago not a blade of grass could be seen—

—ARCHIBALD GORRIE, *in the Transactions of the Royal Scottish Arboricultural Society.—(Timber Trades Journal.)*

VII.—TIMBER AND PRODUCE TRADE.

Churchill and Sim's Circular.

JUNE 5th 1893.

EAST INDIA TEAK.—The deliveries for the first five months of this year have been 5,307 load againsts 4,269 loads for the corresponding periods of 1892 and 1891 respectively. In May this year the delivery has been 1,444 loads: in May 1892, it was 1891 loads, and in May, 1891, 1,208 loads. The stock has been reduced and that is so far good, but there has been no change in prices, as these deliveries are still due to the fact of an unusual proportion of the regular Navy requirements being taken from London under contracts arranged and discounted some time back. They do not therefore now affect the general market.

ROSEWOOD is inactive, therefore stocks though not excessive are sufficient.

SATINWOOD. Finely figured *logs*, of good sizes, would sell well, but for small plain logs, and for *planks* and *boards* there is no demand.

EBONY Considerable sales have been made, but were only possible at low prices.

PRICE CURRENT.

Teak	per load	£9	to	£15
Satinwood	„ ton		o	£ 12
Rosewood	„ „	£5	to	£9
Ebony	„ „	£5	to	£7

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

6th June, 1893.—No. 588-F.—The following transfers are made in consequence of the death of Mr. G. H. Foster, Deputy Conservator of Forests, Coorg :

Mr. G. F. Prevost, Deputy Conservator, Berar, to Coorg.

Mr. H. Calthrop, Deputy Conservator, Burma to Berar.

7th June, 1893.—No. 593-F.—Consequent on the return of Mr. R H. C. Whittall, Conservator of Forests, 2nd grade, from the special leave granted him, in the Notification of this Department, No. 238-F., dated the 14th February last and with effect from 26th May, 1893.

(i) Mr. Whittall to resume charge of the Punjab Forest Circle.

(ii) Mr. P. J. Carter, Conservator, 3rd (officiating 2nd) grade, Pegu Forest Circle, Lower Burma, to revert to his substantive grade.

(iii) Mr. C. F. Elliott, Deputy Conservator, 1st grade, Baluchistan, and officiating Conservator, 3rd grade, Punjab Forest Circle, to revert to his substantive appointment.

No. 597-F.—With reference to the Notifications of this Department, No. 238-F., dated the 24th February, last, and No. 593-F., dated the 7th instant, Mr. A. V. Monro, Officiating Deputy Conservator of Forest, 4th grade, Baluchistan, is re-transferred to the Punjab on being relieved by Mr. C. F. Elliott, Deputy Conservator, 1st grade.

No. 600-F.—Mr. A. A. Watson, Assistant Conservator of Forests, 1st grade, Central Provinces, is permitted, at his own request, to resign his appointment, with effect from 6th April, 1893.

16th June, 1893.—No. 624-F.—The following promotions are made in consequence of the retirement from the service of Mr. W. R. Fisher, Conservator of Forests. 2nd Grade (on deputation in England). with effect from 1st January, 1893 :

Mr. S. Eardley-Wilmot, Conservator, 3rd Grade, and officiating in the 2nd Grade, North-Western Provinces and Oudh, is confirmed in the latter grade.

Major C. T. Bingham, I. S C., Deputy Conservator, 1st Grade, and officiating Conservator, 3rd Grade, Tenasserim Forest Circle, Lower Burma, is confirmed in the latter grade.

2.—Madras Gazette.

20th May, 1893 —No. 252.—Mr. H A. Gass, District Forest Officer, Madura, is granted privilege leave for three months from or after 10th June 1893, under article 291 of the Civil Service Regulations.

No. 253 —Mr. S. C. Moss, Extra Asistant Conservator of Forests Second Grade, to act as District Forest Officer, Madura, during the, absence of Mr. H. A. Gass on leave, or until further orders.

25th May 1893.—No. 255.—The privilege leave granted to Mr. C. D. McArthy, District Forest Officer, Vizagapatam, and the appointment of Mr. H. H. Ward to act for him, notified at pages 458 and 475 of Part I of the *Fort St. George Gazette*, dated 25th April, and 2nd May, 1893, respectively, are hereby cancelled.

16th May 1893.—No. 256.—

No.	Name and designation of officer.	Present grade.	Grade to which promoted.	Nature of promotion.	Remarks showing cause of vacancy, &c.
1	Mr. C. D. McArthy, Acting District Forest Officer, Vizagapatam.	Assistant Conservator of Forests, Second Grade.	Assistant Conservator of Forests, First Grade.	Permanent.	With effect from the date of his passing the Higher Standard Examination in Vernacular.
2	Mr. C. DuPré Thornton, District Forest Officer, Tinnevelly.	Do.	Do.	Do.	Do.
4	Mr. R. McIntosh, Acting District Forest Officer, Cuddapah.	Do.	Do.	Do.	Do.
4	Mr. A. B. Jackson, Actting District Forest, officer, Anantapur.	Do.	Do.	Do.	Do.

21st May 1893.—Ranger J. Tapp, North Arcot District, to act as Ranger, 4th Grade, with effect from 23rd April 1893.

Forester 1st Grade C. Dhan Sing, Trichinopoly District, to act as Ranger, 5th Grade, with effect from the 14th May 1893.

24th May 1893.—The three months' privilege leave granted to, M. R. Ry. Maduranayagam Pillay, Sub-Assistant Conservator of Forests, 2nd Grade, and notified at page, 428, Part II of the *Fort St. George Gazette* of 14th March 1893, to take effect from the 11th May 1893, nstead of from 15th April 1893.

17th May 1893.—V. P. Ramalingam Pillai, Ranger on Rs. 125 Tinnevelly District, is granted leave on medical certificate for three months, under article 369 of the Civil Service Regulations, from 6th May 1893.

18th May 1893—S. Arokiasami Pillai, Forest Ranger, Fifth Grade, Ganjam District, is transferred to Vizagapatam District.

This cancels office order No.13 of 1893-94.

27th May 1893.—Mr. C. P. Howell, Sub-Assistant Conservator of Madura, is granted privilege leave on medical certificate, under article 291 of the Civil Service Regulations, for one month from 7th May 1883.

1st June. 193.—Hr. S. C. Moss, Assistant Conservator of Forests, is transferred from Tinnevelly District to Madura District, pending his taking charge from the District Forest Officer, Madura District, under *Fort St. George Gazette*, Notification No. 253, dated 20th May 1893, published in the issue of 30th May 1893, Part I.

17th June 1893.—No. 308.—Mr. C. J. Woutersz, Acting District Forest Officer, South Arcot, is granted privilege leave for three months, with effect from or after the 1st July 1893, under article 291 of the Civil Service Regulations.

21st June 1893.—V. P. Ramalingam Pillai, Ranger on Rs. 125 is transferred to North Malabar—to join on completion of his leave.

T. C. R. Malaya Pillai, Ranger on Rs. 80, is transferred from North Malabar to Tinnevelly.

3.—BOMBAY GAZETTE.

29th May 1893.—No. 3888.—Mr. W. A. Willinger, Extra Assistant Conservator of Forests, Second Grade, and Divisional Forest Officer, Surat, is granted an extension by twenty-five days of the privilege leave of absence for one month allowed to him in Notification dated 18th April, 1893, published at page 388 of the *Bombay Government Gazette* of the 27th idem, Part I, by the Deputy Conservator of Forests, N. C.

25th May 1893.—Messrs. B. H. Dalal, Extra Assistant Conservator of Forests, and E. G Oliver, Assistant Conservator of Forests, respectively delivered over and received charge of the Divisional Forest Office, West Khándesh, on the forenoon of the 19th instant.

30th May 1893 Mr. L. D. Joshi, Extra Assistant Conservator of Forests, delivered over and Mr. E. G. Oliver, Assistant Conservator of Forests, received charge of the East Khándesh Divisional Forest Office on the afternoon of the 22nd, May 1893.

3rd June 1893.—Mr. F. R. Dasai, Deputy Conservator of Forests N. C., delivered over and Mr. W. A. Wallinger, Extra Assistant Conservator of Forests, Second Grade, received charge of the Divisional Forest Office, Surat, on the 31st of May 1893, before noon.

14th June 1893.—No. 4270.—His Excellency the Governor in Council is pleased to appoint Mr. J. H. Clabby to do duty as Divisional Forest Officer, Sholápur.

20th June 1893.—No. 4432.—Mr. R. H. Madan, Extra-Assistant Conservator of Forests and Divisional Forest Officer, East Khándesh, is allowed leave on medical certificate for two months under Article 369 of the Civil Service Regulations.

21st June 1893.—No. 4479.—Mr. G. A. Hight, Deputy Conservator of Forests, Second Grade, has been allowed by Her Majesty's Secretary of State for India an extension of leave on medical certificate for six months.

17th June 1893.—Messrs. T. R. D. Bell and B. J. Haselden respectively delivered over and received charge of the Central Division of Kánara on the afternoon of the 12th June 1893.

27th June 1893.—Mr. E. G. Oliver, Assistant Conservator of Forests, delivered over and Mr. R. H. Madan, L. C. E., Extra Assistant Conservator of Forests, received charge of the Divisional Forest Office, East Khándesh, on the forenoon of the 20th of June 1893.

No. 196.—His Excellency the Right Honourable the Governor of Bombay, under the authority vested in him by the Indian Councils Acts, 1861 and 1892, has been pleased to nominate the undermentioned gentlemen to be Additional Members of the Council of the Governor of Bombay for the purpose of making Laws and Regulations only :—

Mr. A. T. Shuttleworth.

4.—BENGAL GAZETTE.

19*th June* 1893.—The report of the Central Examination Committe, having been received, the result of the Half-yearly Departmental Examination of Assistant Magistrates and others, held in May 1893, is published for general information :—

1. Mr. C. C. Hatt, Assistant Conservator of Forests, has passed in Hindustani by the higher standard·

2. Mr F. Trafford, Assistant Conservator of Forests, has passed in Hindustani by both standards, and in Land Revenue Systems.

3. Mr A. H. Mee, Extra Assistant Conservator of Forests, has passed in Hindustani by the higher standard.

19*th June*, 1893.—No. 2368.—Mr. C. A. G. Lillingston, Deputy Conservator of Forests and Personal Assistant to the Conservator of Forests, Bengal, assumed charge of the Darjeeling Forest Division on the afternoon of the 5th May, 1893, from Mr. F. B. Manson, Deputy Conservator of Forests, granted two years' furlough.

19*th June*, 1893—No. 2369.—Consequent on the grant, with effect from the 13th May, 1893 of two years furlough to Mr. F. B. Manson, Deputy Conservator of Forests, 2nd Grade, the following temporary promotions are made in the Upper Controlling Staff of the Bengal Forest Service :—

Mr. G. A. Richardson, Deputy Conservator of Forests, 3rd grade, is appointed to officiate in the 2nd grade of Deputy Conservators

Mr. C. G. Rogers, Deputy Conservator, 4th grade (seconded), is appointed to officiate in the 3rd grade of Deputy Conservators.

Mr H. D. D. French, Deputy Conservator, 4th grade (provisionall) is appointed to officiate in the 3rd grade of Deputy Conservators, *vice* Mr. C G. Rogers (seconded).

24*th June* 1893 —No. 2375.—Mr. F. Trafford, Assistant Conservator of Forests attached to the Singhbhum Division, is granted six months' leave on medical certificate, under article 343 of the Civil Service Regulations, with effect from the 13th June 1893

5.—N W. P. AND OUDH GAZETTE.

29*th May* 1893.—No. 1465 11—32A.—Mr. E L. Haslett, Extra Assistant Conservator of Forests, from the Grhwal to the Naini Tal Forest Division of the Central Circle.

No. 1476—11—626C —In supersession of Notification No. 1310 —11—626C'—dated 9th May 1893, Mr. F. A. Leete, Assistant Conservator of Forests, attached to the Garhwál Forest Division, Central Circle, to hold charge of the Kumaun Forest Division

during the absence on leave of Mr. J. M. Blanchfield, Extra Assistant Conservator, or until further orders.

21*st June* 1893.—No. 1738.—Mr. B. A. Rebsch, Deputy Conservator of Forests, Bahraich Forest Division, in the Oudh Circle, privilege leave for three months, with effect from the 20th July 1893.

21*st June* 1893. No. 1739—II—651B—Mr. B. B Osmaston Assistant Conservator of Forests, Working Plans Officer, attached to the Direction Division of the Oudh Circle, to officiate as Deputy Conservator of Forests, 4th grade, and to hold charge of the Bahraich Forest Division, in the same Circle, during the absence on leave of Mr. B. A. Rebsch, or until further orders.

6.—PUNJAB GAZETTE.

19*th June* 1893.—No. 368.—Messrs L. Gisborne Smith, Deputy Conservator of Forests, and A V. Monro, Officiating Deputy Conservator of Forests, respectively made over and received charge of the Direction Division and the duties of Personal Assistant to the Conservator of Forests,, Punjab, on the afternoon of the 8th June, 1893.

7—CENTRAL PROVINCES GAZETTE.

25*th May* 1893.—No. 15.—Mr. R. H. Cole, Forester, 1st grade, in the Nimar Forest Division, having complied with the conditions laid down in Section 29 (I) of the Forest Department Code, is promoted, under Section 49 of said Code, to Ranger, 6th grade, on Rs. 50 per mensem, on probation for one year, with effect from the 1st April 1893.

21*st June* 1893.—No. 4679 —The undermentioned officer of the Forest Department is declared to have passed the prescribed Departmental Examination in Forest Law:—

Mr. S. R. Parsons, Forest Ranger.

8.—BURMA GAZETTE.

25*th May* 1893. No 190.—Mr. D L. K. Calderwood, Extra Assistant Conservator of Forests, is transferred from Alôn to the charge of the Gangaw subdivision, of the Yaw Forest division, with headquarters at Gangaw.

11*th May* 1893. No. 4.—Mr. C. Ingram, Extra Assistant Conservator of Forests, made over, and Mr. P. W. Healy, Extra Assistant Conservator of Forests, received charge of, the Agency division on the afternoon of the 8th May 1893.

18*th May* 1893. No. 6.—With reference to Revenue Department Notification No. 177, dated the 10th instant, Mr. C W. A. Bruce, Assistant Conservator of Forests, made over, and Mr. H. H. Forteath, Assistant Conservator of Forests, Paungbyin subdivision, assumed charge of the Upper Chindwin Forest division on the afternoon of the 3rd May 1893 in addition to his other duties.

No. 7.—With reference to Revenue Department Notification No. 177, dated the 10th instant, Mr. C. W. A. Bruce, Assistant Conservator of Forests, reported his arrival in Mandalay, and assumed charge of his duties as Personal Assistant to the Conservator of Forests, Eastern and Western Circles, on the forenoon of the 15th instant.

23rd May 1893. No. 5.—Mr. P. W. Healy, Extra Assistant Conservator of Forests, made over, and Mr. G. R. Long, Assistant Conservator of Forests, received charge of, the Agency division on the afternoon of the 20th May, 1893.

23rd May 1893. No. 6.—Mr. G. R. Long, Assistant Conservator of Forests, made over, and Mr. C. Ingram, Extra Assistant Conservator of Forests, received, charge of the South Tenasserim division on the afternoon of the 12th May, 1893.

23rd May 1893 No. 3.—Mr. C. W. Alan, Extra Assistant Conservator of Forests, availed himself on the forenoon of the 16th May 1893 of the privilege leave granted him in Revenue Department Notification No. 160 (Forests), dated the 27th April, 1893.

23rd May 1893. No. 4. —With reference to Revenue Department Notification No. 162 (Forests), dated the 27th April 1893, Mr. C. W Allan, Extra Assistant Conservator of Forests, and Mr. C. R. Dun Assistant Conservator of Forests, respectively made over and received charge of the Myadaung subdivision of the Katha Forest division on the afternoon of the 15th May 1893.

31st May 1893 No 193.—The following officers have been granted extensions of leave by the Secretary of State for India for the periods noted against them :—

Mr. J Copeland, Deputy Conservator of Forests, four months extraordinary leave without pay.

Mr. H. Carter, Assistant Conservator of Forests, three months leave on medical certificate.

1st June 1893 No. 194.—Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, is transferred from Kindat to the charge of the Paungbyin subdivision of the Upper Chindwin forest division.

29th May 1893. No. 7.—With reference to Revenue Department Notification No. 190 (Forests), dated the 25th May 1893, Mr. D. L. K Calderwood, Extra Assistant Conservator of Forests, made over, and Mr. T. H. Aplin, Deputy Conservator of Forests, assumed, charge of the Alôn Revenue subdivision, Lower Chindwin Forest division, on the forenoon of the 22nd inst., in addition to his other duties 1893 No. 8.—3rd May 1803, in addition to other duties.

31st May 1893. No. 8.—With reference to Revenue Department Notification No. 177, dated the 10th instant, Mr. C. W. A. Bruce, Assistant Conservator of Forests, made over, and Mr. H. H ·Forteath, Assistant Conservator of Forests, in charge of the Paungbyin subdivision, received, charge of the Upper Chindwin Forest division on the afternoon of the 3rd May 18C3, in addition to other duties.

5th June 1893. No. 9.—Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, assumed charge of the Paungbyin Revenue station, Upper Chindwin Forest division, with effect from the 1st June 1893.

10th June 1893 No. 204.—In superesession o' this departments Notification No. 194, dated the 1st June 1893, Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, is transferred from Kindat to

the charge of the Paungbyin revenue station of the Upper Chindwin Forest divison.

No. 205.—The following transfers are ordered :—

Mr. C. W. A. Bruce, Assistant Conservator of Forests, from Mandalay to the charge of the Upper Chindwin Division.

Mr. H. Forteath, Assistant Conservator of Forests, from Kindat to Mandalay, as Personal Assistant to the Conservator of Forests, Eastern and Western Circles.

19*th June* 1893. No. 215.—Mr. J. Messer, Assistant Conservator of Forests, is transferred from the Working Plans division to the Toungoo division, Pegu Circle

No 216.—The Chief Commissioner appoints Mr. C. W. A. Bruce, Assistant Conservator of Forests, to the charge of the Paungbyin subdivision of the Upper Chindwin division in addition to his other duties.

No 223.— Mr. C R. Dun, Assistant Conservator of Forests, it transferred from Tigyaing to the charge of the Mandalay Forest Division.

No. 224.—Mr. R. F Lowis, Extra Assistant Conservantor of Forests is appointed to the charge of the Myadaung subdivision of the Katha Forest division in addition to his to other duties.

21*th June* 1893 No. 225-—Mr. J. Allmark, Extra Assistant Conservator of Forests, is permitted to return to duty within the period of the leave granted to him in this department Notification No. 115, dated the 29th March 1893, and is posted to the charge of the Agency and. Depot division of the Pegu circle.

No. 226.—Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, is transferred to the charge of the Pegu subdivision of the Rangoon Forest divison on being relieved by Mr. Allmark

9.—ASSAM GAZETTE.

16*th June* 1893. No. 1 —The undermentioned candidates have been awarded Scholarships of Rs. 30 each per mensem in the Dehra Dun Imperial Forest School :

Babu Krishna Chandra Sarma, Sylhet.

Mr. W. Breaky. Dhubri.

10.—HYDERABAD RESIDENCY GAZETTE

29*th April* 1893, No .115-B.—The Resident is pleased to declare that the following Extra Assistant Conservators have passed the Higher Standard Examination in Marathi prescribed for Forest Officers in the Hyderabad Assigned Districts :—

Mr. B. Bhukan.

„ Sreenivasalu Naidu.

1*st May* 1893. No. 116i—Under the provisions of Government of India, Revenue and Agricultural Department, Circular No. 18-F, dated the 29th July 1891, the following changes in the position and designation of the officers of the Lower controlling staff of the Forest service in the Central Provinces, Berar and Coorg, shall have effect from the 26th February 1891 :—

Name.	From	To
Mr. Chander Kumar Chatterji ...	Sub-Asst. Consr. of Forests, 1st grade ...	Extra Asst Consr. of Forests, 1st grade'
Khan Sahib Mahomed Ghouse ..	Do. do. ...	Do. do.
Mr. Mansukh Rai	Do. 2nd grade ...	Do. do.
Mr. Shridhar Ganesh Paranjpe	Do. do. ..	Do. 2nd grade.
Mr. Norman Chester McLeod ...	Do do. ...	Do. do.
Mr. J. J. Hobday... ...	Do 3rd grade ...	Do. do.
Mr. C. H. Haldane. ...	Do. do. ...	Do. 3rd grade
Mr. Ahmed Ali., ...	Do. do. ...	Do. do.
Mr. Rasul Khan.	Do. 2nd grade ...	Do. 4th grade.
Mr. Bukhan	Offg. do. 3rd grade	Offg. do.
Mr. Ramchandra Krishna. ...	Do. do. ...	Do. do. do.
Mr. R. C. Thompson. ...	Do. do. on probation. ...	on probation.

1*st* May 1893 No 117.—Mr. Srinivasulu Naidu, Sub-Assistant Conservator of Forests, 3rd grade, on probation, is appointed Extra Assistant Conservator of Forests, 4th grade, on probation, with effect from the 5th May 1891.

" No. 118.—Mr. Bukhan, Officiating Extra Assistant Conservator of Forests, 4th grade, is confirmed in that grade with effect from the 1st October 1891.

" No. 119.—Mr. Srinivasulu Naidu, Extra Assistant Conservator of Forests, on probation, is appointed Extra Assistant Conservator of Forests, 4th grade, with effect from the 21st July 1892

" No. 120 —Mr. L. K. Martin is appointed as Extra Assistant Conservator of Forests, 4th grade, on probation, with effect from the 24th July 1892.

11. MYSORE STATE GAZETTE;

21*st June* 1893. No 21137—G. 5254—Mr. C E. M Russell, Superintendent of Forests and Government Farms, having returned from the 3 years and 4 months' leave granted him in Notifications No. 47. dated 5th June 1890, and No. 422, dated 24th February 1891, and reported himself for duty on the 1st instant, the unexpired portion of his leave is hereby cancelled.

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